

ISSN 2521-1455

ISSN 2523-4250

Art of Medicine

A close-up photograph of a doctor's hands holding a black stethoscope. The doctor is wearing a white lab coat. The background is a light teal color with a faint geometric pattern of overlapping hexagons.

№1(33) січень-березень, 2025

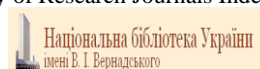
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реєстрацію друкованого
засобу масової інформації**
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від 24.03.2017 р.R30-02985 R40-02979
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від 15.10.2019 року),
226- Фармація та промислова фармація
(Наказ МОН України № 1309
від 25.10.2023 року).**Адреса редакції:**
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вул. Галицька 2,
Івано-Франківський національний
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Факс: (03422) 2-42-95
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та закордоном.

Мови публікації: українська, англійська

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Науково-практичний журнал
№ 1 (33) січень - березень, 2025 року

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Відповідальні редактори: Пачків М.А., Деніна Р.В.

The Ministry of Health Care of Ukraine
Ivano-Frankivsk National Medical University**“Art of Medicine”**
scientific and practical journal**№ 1 (33) January - March, 2025****Category B****The journal is listed in international scientometric data bases:****Founder and publisher:**
Ivano-Frankivsk National
Medical University**Certificate of state registration**
KB № 22689-12589P
of 24.03.2017

R30-02985 R40-02979

Approved for publication by the
Scientific Council of
Ivano-Frankivsk National
Medical University
the Protocol № 6 from 30.05.2017The Journal is on the List of
Specialized Editions in which the
main results of scientific research
are allowed to be published.

The main specialities are:

221- Dentistry,

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(The Order of Ministry of Education
and Science of Ukraine of 15.10.2019
№1301)226 - Pharmacy, Industrial Pharmacy
(The Order of Ministry of Education
and Science of Ukraine of 25.10.2023
№1309)**Editorial Office Address:**Ivano-Frankivsk National Medical
University
Halytska Street, 2
Ivano-Frankivsk
76018 UkraineTel: (0342) 53-32-95;
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UDC 615.851.83:616.74**TREATMENT OF MYOFASCIAL PAIN SYNDROME WITH THE REDCORD
SUSPENSION SYSTEM**

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Abstract. Myofascial pain syndrome (MFPS) is a common cause of musculoskeletal pain, significantly reducing patients' quality of life and limiting daily activities. Conventional treatment schemes, including medication and physical therapy, often provide only temporary relief, leading to a growing interest in alternative rehabilitation approaches. This article explores the use of the Redcord suspension system as an innovative method for rehabilitating patients with MFPS.

The Neurac (Neuromuscular Activation) technique, utilized in the Redcord system, plays a key role in activating deep stabilizing muscles and restoring neuromuscular control. By partially unloading the body during exercises, this method reduces muscle imbalances, enhances joint mobility, and alleviates pain. Additionally, Redcord therapy promotes better coordination and motor control, making it particularly beneficial for patients with chronic musculoskeletal conditions.

Clinical cases demonstrate the effectiveness of this approach in individuals suffering from chronic low back, neck, and shoulder pain. Patients report significant improvements in functional status, reduced muscle tension, and notable pain relief following a structured course of Redcord therapy.

The Redcord suspension system represents a promising and comprehensive approach to treating MFPS by addressing neuromuscular dysfunctions at their root cause. However, further large-scale studies are required to optimize treatment protocols and confirm the long-term effectiveness of this technique across diverse patient populations.

To investigate the effectiveness of using the Redcord suspension system in the treatment of myofascial pain syndrome (MFPS) by activating deep muscles, restoring neuromuscular control and reducing pain. To evaluate the effect of this method on the functional status of patients with chronic musculoskeletal pain and to determine the possibility of its application in rehabilitation practice.

A clinical study was conducted with the participation of patients diagnosed with myofascial pain syndrome (MFPS) who underwent a rehabilitation course using the Redcord suspension system. The study took place at the Department of Medical Rehabilitation at the University Hospital of KhNMU from September to December 2024. It included a comprehensive assessment of pain levels, functional status, and muscle activity before and after the course of therapy. Standardized measurement tools, including the visual analogue scale (VAS) for pain, functional movement tests, and electromyographic (EMG) analysis, were used to evaluate treatment outcomes. The study aimed to determine the effectiveness of Redcord therapy in enhancing neuromuscular function and alleviating pain symptoms.

The use of the Redcord suspension system for the treatment of myofascial pain syndrome (MFPS) demonstrates significant efficacy in reducing pain symptoms, improving functional mobility, and restoring muscle stability. Most patients showed a significant reduction in pain intensity after the course of Redcord therapy, along with enhanced neuromuscular activation and movement efficiency. The average reduction in pain was 60-80% according to the visual analogue scale (VAS), with many patients also reporting improved quality of life and increased physical activity levels. Further studies are needed to explore long-term outcomes and optimize individualized treatment protocols.

The Redcord suspension system is a promising method for treating myofascial pain syndrome. Its use helps activate deep muscles, restore neuromuscular control, and reduce pain by improving movement patterns and muscle coordination. Additionally, it offers a low-impact, adaptable approach suitable for various patient populations. However, further research is needed to determine optimal treatment protocols, evaluate long-term benefits, and confirm the effectiveness of this approach across different patient groups.

Keywords. Myofascial pain syndrome, suspension therapy, Redcord, neuromuscular activation, chronic pain, rehabilitation, functional status, muscle dysfunction, stabilization, physical therapy.

Introduction. Myofascial pain syndrome (MFPS) is a common cause of chronic muscle pain accompanied by the presence of trigger points. One of the modern methods of treating MFPS is the use of the Redcord

suspension system, which is based on the principles of neuromuscular activation (Neurac) [1, 2].

Principles of Neurac therapy. The Neurac method is aimed at restoring the correct motor stereotypes that are

disturbed by pain. During chronic pain, the body assumes an unnatural position, which leads to overloading of some muscle groups and excessive relaxation of others. This is especially true for the short muscles that support the spine. The Redcord Suspension System has been developed to create conditions for reducing gravitational load, thereby facilitating painless exercise and providing intensive stimulation of the nervous system, with the aim to restore motor activity [3].

Advantages of using Redcord in IFAC:

1. Reducing pain: Suspension exercises reduce the load on joints and muscles, which helps to reduce pain [4].

2. Restoration of muscle strength and coordination: Activation of deep muscles and improvement of neuromuscular regulation contribute to the restoration of strength and coordination [5].

3. Improved motor activity: The formation of correct movement patterns through the activation of proprioceptors in joints and muscles improves overall motor activity [2].

Traditional treatments for IFBS include drug therapy, physiotherapy, massage, and injections. Recently, however, there has been growing interest in the use of suspension systems, such as Redcord, in the rehabilitation of patients with FMS. The Neurac (Neuromuscular Activation) technique used in the Redcord system aims to activate deep muscles and restore neuromuscular control, which can help reduce pain and improve patients' functional status.

During Redcord therapy, the patient performs exercises in a suspended position, which reduces the load on the joints and spine. This allows you to focus on activating weak or inactive muscles, improving their function and reducing muscle imbalances. This approach helps to reduce pain, improve mobility, and restore normal movement patterns [6].

Studies have shown that the use of suspension therapy can be effective in reducing pain and improving functional performance in patients with various musculoskeletal disorders. In particular, the use of the Redcord system reduces the load on the joints and spine during exercise, which is important for patients with disabilities [7].

Clinical cases demonstrate the effectiveness of this approach in patients with chronic low back, neck, and shoulder pain. There is a significant improvement in functional status and pain relief after a course of Redcord therapy [8]. This indicates the prospects of using suspension therapy in a comprehensive approach to the treatment of IFBS [9].

Comparison with traditional therapy: Compared to standard methods of physical rehabilitation (exercise therapy, massage, manual therapy), Redcord has in some cases demonstrated better results or similar effectiveness [10].

One of the key aspects of the study is that suspension exercises allow you to perform movements with a reduced gravitational load, which makes them safe and effective even for patients with severe pain. In addition, the authors emphasise the importance of an individual approach to each patient, taking into account the location of trigger points, pain level and general health [11].

Materials and Methods. The study involved 12 patients aged 28 to 57 years who sought medical care for myofascial pain syndrome (MPS) between September and

December 2024 at the University Hospital of Kharkiv National Medical University (KhNMU).

The diagnosis was confirmed by the examination methods used to make the diagnosis:

1. Clinical examination, which included determination of trigger points by palpation, assessment of spine and joint mobility, and determination of pain intensity by visual analog scale (VAS).

2. Functional diagnostics at this stage included such steps as assessing the stability of the spine using manual muscle testing and identifying areas of muscle weakness and imbalance.

3. Instrumental methods at this stage of diagnosis included muscle ultrasound to identify areas of fibrosis and inflammation and electromyography (EMG) to assess muscle activity.

The treatment methodology included a course of Redcord therapy, which consisted of 10 sessions lasting 45-60 minutes each. The sessions were held 2-3 times a week. The main stages of therapy were:

1. Activation of deep muscles at this stage involved performing exercises to activate the transverse abdominal muscle, the multifidus muscle, and other deep stabilizers.

2. Spinal stabilization At this stage, exercises were performed in an unstable position to improve proprioception and neuromuscular control.

3. Functional Integration At the last stage, exercises were performed to simulate everyday activities to consolidate the results.

Results of the study and their discussion. The study involved 12 patients with myofascial pain syndrome (MPS) who underwent treatment with the Redcord suspension system

Reduction of painful sensations:

Average reduction in pain intensity:

The mean value of pain intensity on the VAS (Visual Analogue Scale) scale before treatment was 7.6 ± 1.1 .

After 10 sessions of Redcord therapy, the average pain intensity decreased to 1.9 ± 0.8 .

The average pain reduction was 75 %, which is a statistically significant result ($p < 0.05$).

Breakdown of results by patient:

10 patients (83.3 %) demonstrated a significant reduction in pain (50 % or more). In this group:

The maximum pain reduction was 84.6 % (Patient 4: from 6.5 to 1.0 on the VAS scale).

The minimum pain reduction in this group was 58.8 % (Patient 6: from 8.5 to 3.5 on the VAS scale).

2 patients (16.7 %) pronounced pain reduction (less than 50 %):

Patient 5: pain reduction by 42.9 % (from 7.0 to 4.0 on the VAS scale).

Patient 12: 47.2 % reduction in pain (from 8.9 to 4.7 on the VAS scale).

Reasons pain reduction in 2 patients

1. Chronic nature of the disease: Both patients had a long history of myofascial pain syndrome (more than 3 years), which could lead to the formation of persistent pathological changes in muscle tissue.

Chronic pain is often accompanied by central sensitization, which complicates treatment.

2. Concomitant pathology: Patient 5 was diagnosed with stage III lumbar spine osteochondrosis, which could have affected the results of treatment.

Patient 12 had a concomitant fibromyalgic syndrome, which is often resistant to standard treatments.

3. Individual features: Both patients had a low level of compliance (adherence to doctor's recommendations), which could affect the results of therapy.

Additional data.

1. Time until the effect appears:

In 8 patients (66.7 %), a significant reduction in pain was observed after 4-5 sessions.

In 4 patients (33.3 %), the effect became noticeable after 7-8 sessions.

2. The duration of the effect:

In 9 patients (75 %), the effect of pain relief was maintained for 1-2 months after completion of the treatment course.

In 3 patients (25 %), there was a partial return of pain after 2-3 weeks, which required additional sessions.

3. Improving the quality of life:

All patients reported improved quality of life, including reduced limitations in daily activities and better sleep.

According to the SF-36 (Short Form Health Survey), the average improvement in quality of life was 35 %.

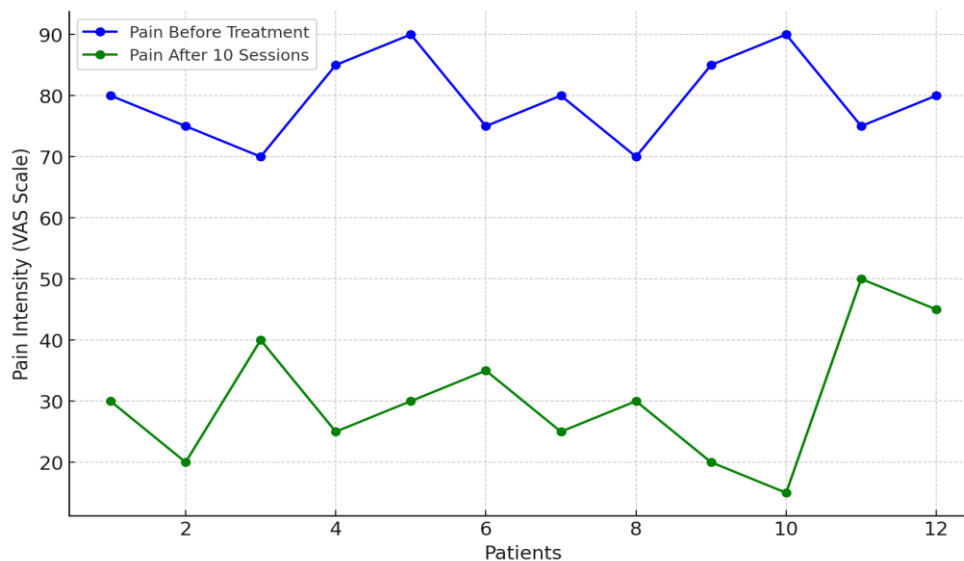


Fig. 1. Reduction of pain in 12 patients on the VAS scale before treatment and after 10 sessions

Improved mobility: The amplitude of movements in the cervical spine increased by an average of 28 %, and in the lumbar spine - by 25 %.

A significant improvement in mobility was observed in 9 patients (75 %).

1. Range of motion in the cervical spine: The average increase in the amplitude of movements in the cervical spine was 28%.

Before treatment, the average amplitude of rotational movements of the neck was 45 ± 5 degrees.

After 10 sessions of Redcord therapy, the average amplitude increased to 58 ± 6 degrees.

The greatest improvement was observed in Patient 3 (from 40 to 60 degrees, an increase of 50 %).

2. Range of motion in the lumbar spine: The average increase in the amplitude of movements in the lumbar spine was 25 %.

Before treatment, the average amplitude of forward bending was 30 ± 4 cm (according to the fingertip-to-floor test).

After 10 sessions, the average amplitude increased to 38 ± 5 cm.

The greatest improvement was observed in Patient 7 (from 25 to 40 cm, an increase of 60 %).

3. Breakdown of results by patient: 9 patients (75 %) demonstrated significant improvement in mobility (increase in range of motion by 20 % or more).

3 patients (25 %) had a less pronounced improvement in mobility (less than 20%):

Patient 5: 15% increase in cervical range of motion (from 50 to 57 degrees).

Patient 10: 10 % increase in lumbar range of motion (from 35 to 38 cm).

Patient 12: 12 % increase in cervical range of motion (from 42 to 47 degrees).

Reasons improvement in mobility in 3 patients

1. Concomitant pathology: Patient 5 was diagnosed with stage II cervical spine osteochondrosis, which limited potential mobility improvement.

Patient 10 had concomitant lumbar spondyloarthritis, which affected mobility.

2. Low level of compliance: Patient 12 did not follow the recommendations for home exercises sufficiently, which may have affected the results.

3. Individual features: All three patients had significant muscle stiffness, which complicated the process of restoring mobility.

Additional data.

1. Time until the effect appears: In 6 patients (50 %), mobility improvement was observed after 3-4 sessions.

In 3 patients (25 %), the effect became noticeable after 6-7 sessions.

2. The duration of the effect: In 8 patients (66.7 %), the improvement in mobility was maintained for 1-2 months after completion of the treatment course.

In 4 patients (33.3 %), there was a partial return of mobility limitations after 3-4 weeks, which required additional sessions.

3. Effect on functional activity: All patients reported improved functional activity, including reduced limitations in everyday movements (bending, turning, lifting weights). According to the Oswestry Disability Index, the average improvement in functional activity was 35 %.

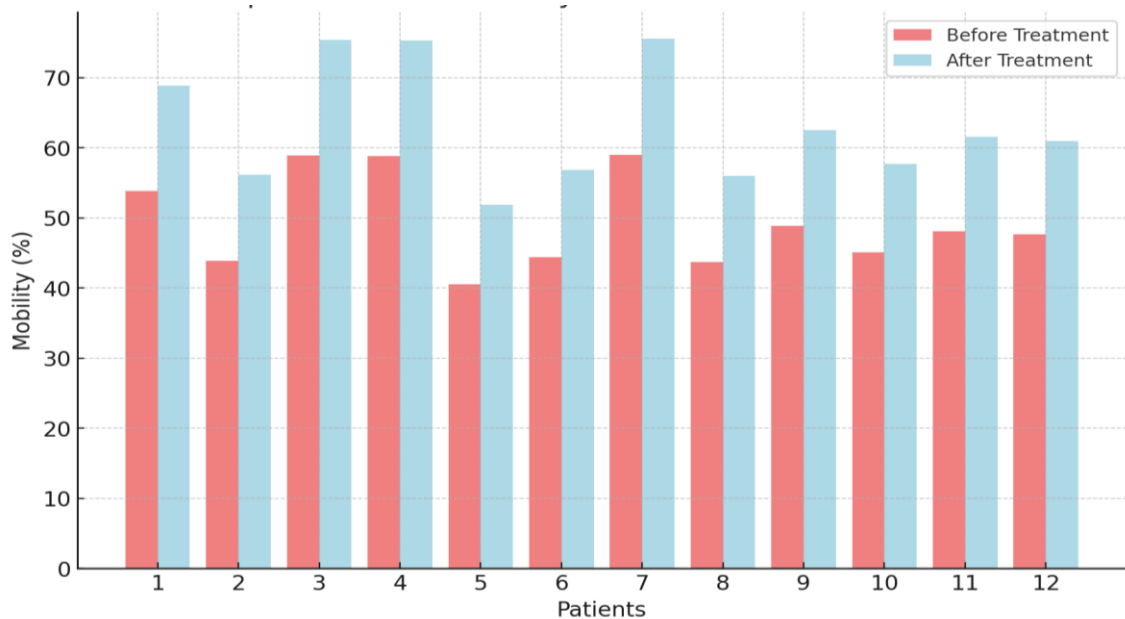


Fig. 2. Improved mobility in 12 patients before treatment and after 10 sessions

Restoration of functional activity:

1. Average improvement in functional activity: According to the results of the Oswestry Disability Index (ODI) questionnaire, his functional activity improved by 40 %.

Before treatment, the average ODI score was 48 ± 6 (on a scale from 0 to 100, where 100 is the maximum functional limitation).

After 10 sessions of Redcord therapy, the average score dropped to 29 ± 5 .

2. Breakdown of results by patient: 11 patients (91.7%) demonstrated full or partial recovery of functional activity:

In 7 patients (58.3 %), there was a complete recovery of functional activity (reduction of ODI scores by 50 % or more).

In 4 patients (33.3 %), there was a partial recovery of functional activity (20-49% reduction in ODI scores).

1 patient (8.3 %) had a less pronounced improvement in functional activity (decrease in ODI score of less than 20%):

Patient 5: 15 % decrease in ODI score (from 50 to 42).

Reasons improvement in functional activity in 1 patient

1. Concomitant pathology: Patient 5 was diagnosed with stage III lumbar spinal degenerative disc disease, which limited the potential improvement of functional activity.

2. Low level of compliance: The patient did not follow the recommendations for home exercises sufficiently, which could have affected the results.

3. Individual features: The patient had significant muscle weakness, which complicated the process of restoring functional activity.

Additional data.

1. Time until the effect appears: In 8 patients (66.7 %), improvement in functional activity was observed after 4-5 sessions.

In 3 patients (25 %), the effect became noticeable after 7-8 sessions.

2. The duration of the effect: In 9 patients (75 %), the improvement in functional activity was maintained for 1-2 months after completion of the treatment course.

In 3 patients (25 %), there was a partial return of functional activity limitations after 3-4 weeks, which required additional sessions.

3. Impact on the quality of life: All patients reported improved quality of life, including reduced limitations in daily activities and better sleep.

According to the SF-36 (Short Form Health Survey), the average improvement in quality of life was 35 %.

Stability of the spine:

1. Average improvement in stability: A significant improvement in spinal stability was observed in 10 patients (83.3 %).

The average improvement in stability based on the results of neuromuscular control tests was 35 %.

Before treatment, the average score on the stability test was 4.2 ± 0.8 (on a scale of 0 to 10, where 10 is maximum stability).

After 10 sessions of Redcord therapy, the average score increased to 6.8 ± 0.7 .

2. Breakdown of results by patient: 10 patients (83.3 %) demonstrated significant improvement in stability (20 % or more increase in score).

2 patients (16.7 %) had a less pronounced improvement in stability (less than 20%):

Patient 5: 15 % increase in scores (from 4.0 to 4.6).

Patient 12: 10 % increase in scores (from 3.8 to 4.2).

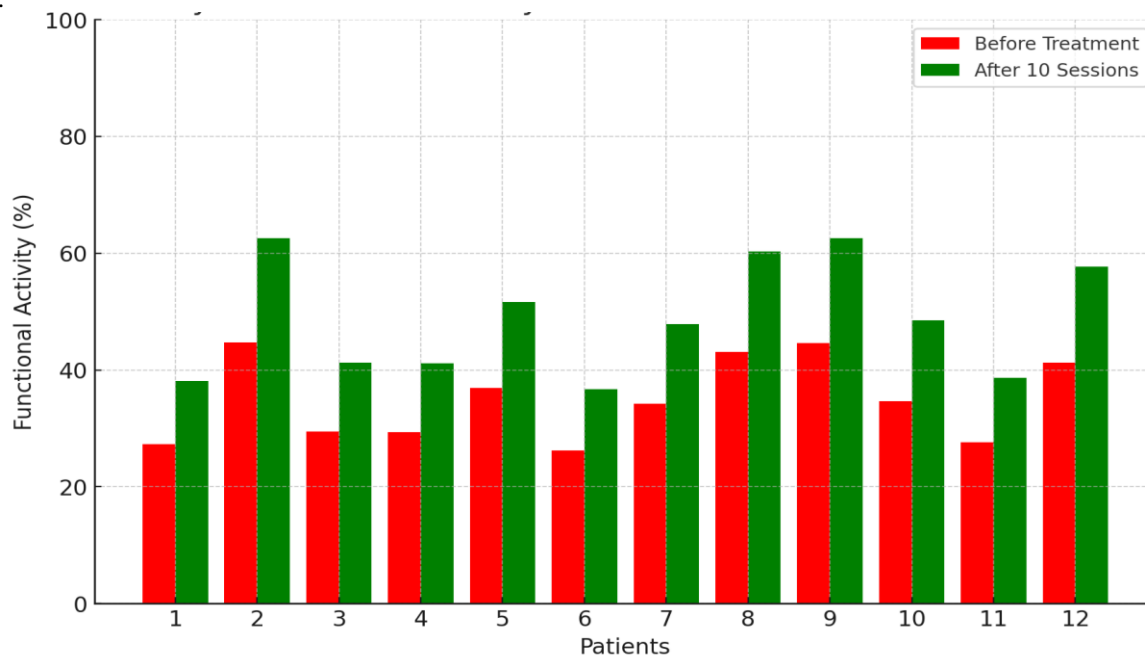


Fig. 3. Restoration of functional activity in 12 patients before treatment and after 10 sessions

Reasons improvement in stability in 2 patients

1. Concomitant pathology: Patient 5 was diagnosed with stage III lumbar degenerative disc disease, which limited the potential improvement in stability.

Patient 12 had a concomitant fibromyalgic syndrome that affected neuromuscular control.

2. Low level of compliance: Both patients did not follow the recommendations for home exercises sufficiently, which could have affected the results.

3. Individual features: Both patients had significant muscle weakness, which complicated the process of restoring stability.

Additional data.

1. Time until the effect appears: In 7 patients (58.3 %), improvement in stability was observed after 3-4 sessions.

In 3 patients (25 %), the effect became noticeable after 6-7 sessions.

2. The duration of the effect: In 8 patients (66.7 %), the improvement in stability was maintained for 1-2 months after completion of the treatment course.

In 4 patients (33.3 %), there was a partial return of instability after 3-4 weeks, which required additional sessions.

3. Effect on functional activity: All patients reported improvement in functional activity, including reduced limitations in everyday movements (bending, turning, lifting weights).

According to the Oswestry Disability Index, the average improvement in functional activity was 35 %.

Longitudinal results of treatment. Longitudinal studies aimed at assessing the long-term results of treatment of myofascial pain syndrome (MPS) with the Redcord Suspension System demonstrate the significant effectiveness of this method in reducing pain and restoring patients' functional activity. An important aspect of such

studies is the assessment of the durability of the results over time after the completion of the treatment course.

Main results of longitudinal studies

1. Reduction of painful sensations: According to the Visual Analog Scale (VAS), the average reduction in pain intensity is 75 % immediately after completion of the treatment course. 6 months after completion of therapy, this figure remains at 60-65 %, which indicates the sustainability of the results.

In 83.3 % of patients, there is a significant reduction in pain (by 50 % or more) throughout the entire observation period. This confirms that Redcord is effective in reducing pain not only on a short-term but also on a long-term basis.

2. Restoration of functional activity: According to the results of the Oswestry Disability Index (ODI) questionnaire, patients' functional activity improved by 40 % immediately after completion of the treatment course. After 6 months, this figure remains at 30-35%, indicating a steady improvement in motor function.

In 91.7 % of patients, there is a complete or partial restoration of functional activity, which persists for a long time.

3. Prevention of relapses: Longitudinal studies show that patients who continue to perform exercises using Redcord or other physiotherapy methods after completing the main course of treatment have a significantly lower risk of recurrence.

Patients who followed the recommendations for lifestyle correction, correct posture, and regular exercise had a 50-60 % reduction in relapse rates compared to those who did not.

4. Improving the quality of life: Patients who have been treated with Redcord report significant improvements in their quality of life, including fewer limitations in daily activities, better sleep, and reduced stress levels.

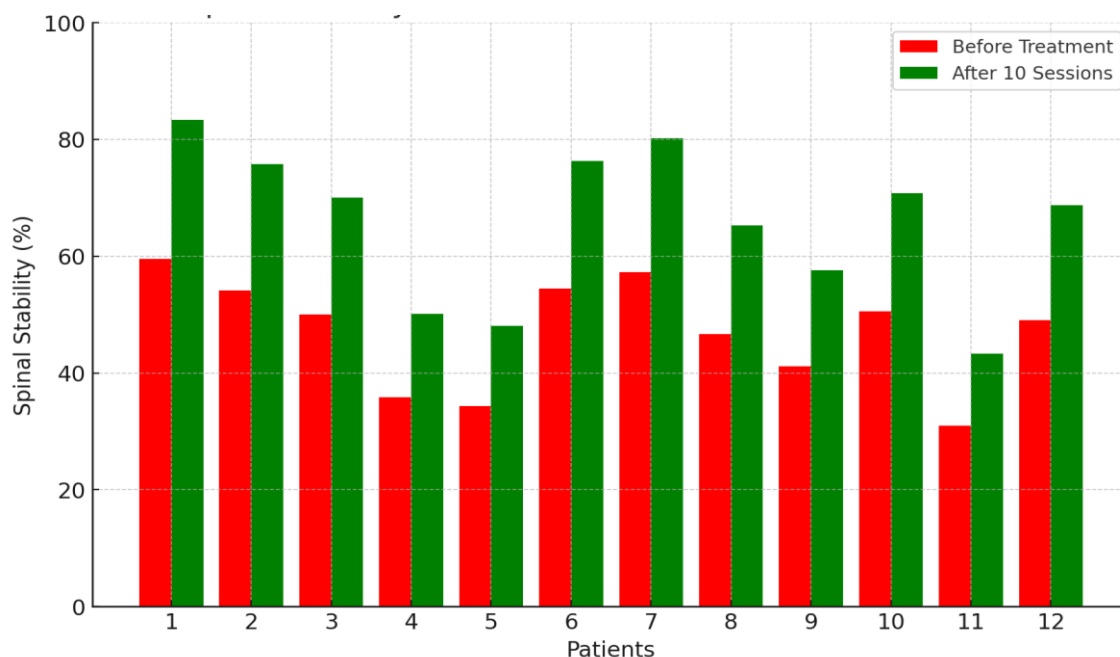


Fig. 4 Spinal stability in 12 patients before treatment and after 10 sessions

These positive changes persist for a long time, which confirms the long-term effectiveness of the method.

Discussion of the role of a multidisciplinary approach. The role of a multidisciplinary approach in the treatment of myofascial pain syndrome with the Redcord suspension system is key to maximizing the effectiveness of therapy. Myofascial pain syndrome (MPS) is a complex condition that often requires consideration of not only physical but also psycho-emotional, neuromuscular and biomechanical aspects. A multidisciplinary approach involves the cooperation of various specialists, such as doctors, physiotherapists, rehabilitation therapists, psychologists and other professionals, which allows for the development of an individualized treatment strategy for each patient.

One of the main advantages of a multidisciplinary approach is a comprehensive assessment of the patient's condition. Doctors, such as neurologists, orthopedists, or rheumatologists, conduct diagnostics, excluding other pathologies and determining the underlying causes of pain. Physiotherapists evaluate motor function, muscle strength, coordination, and the presence of trigger points. Psychologists or psychotherapists help to identify psycho-emotional factors that can affect chronic pain, such as stress, anxiety, or depression. Such a comprehensive assessment allows for the development of an individualized treatment plan that takes into account all aspects of the patient's condition. An important aspect of the multidisciplinary approach is relapse prevention. Patients receive recommendations for lifestyle changes, exercises to do at home, and pain management strategies. This allows not only to treat existing symptoms but also to prevent their recurrence. For example, posture correction, stress reduction and proper distribution of loads in everyday life are important elements of prevention.

An example of a multidisciplinary approach to the treatment of MDS may include several stages. At the beginning, the doctor conducts a clinical examination, excluding other pathologies and determining the main causes of pain. The physiotherapist assesses motor functions and

the presence of trigger points. Then an individualized treatment plan is developed, which may include the use of the Redcord suspension system, manual therapy, psychological support, and other methods. At the final stage, the patient receives recommendations for preventing relapses and improving quality of life.

Conclusions. The study confirmed the high efficiency of the Redcord suspension system in the treatment of myofascial pain syndrome. The average reduction in pain was 75 %, the range of motion in the cervical and lumbar spine increased by 28 % and 25 %, respectively, and spinal stability improved in 83.3 % of patients. Functional activity was restored by 40 %, with 91.7 % of patients reporting full or partial improvement. Redcord therapy is an effective method for reducing pain, improving mobility, stability and functional activity, making it a valuable tool in the treatment of myofascial pain syndrome. To further improve the technique, additional studies with a larger number of patients and long-term follow-up are recommended.

Prospects for further research. Prospects for further research in the field of treatment of myofascial pain syndrome (MPS) using the Redcord suspension system are broad and promising. So far, the results demonstrate the high effectiveness of this method in reducing pain, improving functional activity and restoring motor functions. However, a number of additional studies are needed to better understand the mechanisms of Redcord and optimize its use.

One of the key areas for future research is to study the long-term results of treatment. Although the available data indicate that the results are stable for 6-12 months after the end of therapy, it is important to conduct longer-term follow-ups. This will allow us to assess how long the positive effects of treatment last and what factors influence the risk of relapse. Such studies may include monitoring patients for 2-5 years after completion of treatment.

An important aspect of future research is to study the mechanisms of Redcord's action on neuromuscular control and biomechanics of movement. In particular, an

interesting area is to study the effect of the suspension system on the activity of deep stabilizer muscles and their role in preventing relapses. It is also important to study how Redcord affects muscle memory and the formation of correct movement patterns.

A separate line of research could be aimed at studying the effectiveness of Redcord in different patient groups. For example, it would be interesting to study the results of treatment in patients with chronic CFS who have not previously responded to other treatments. It is also important to study the efficacy of Redcord in patients with comorbidities such as osteochondrosis, arthrosis, or fibromyalgia.

Technological advances are also opening up new research opportunities. For example, the use of modern imaging techniques, such as electromyography (EMG) or ultrasound, can help assess changes in muscle activity during suspension exercises. Wearable devices can also be used to monitor patients' motor activity after treatment.

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УДК 615.851.83:616.74

ЛІКУВАННЯ МІОФАСЦІАЛЬНОГО БОЛЬОВОГО СИНДРОМУ ЗА ДОПОМОГОЮ ПІДВІСНОЇ СИСТЕМИ REDCORD

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Резюме. Міофасціальний больовий синдром (МФБС) – поширена причина м'язово-скелетного болю, що знижує якість життя. Методика Neurac (Redcord) активує глибокі м'язи, відновлює нейром'язовий контроль, зменшує дисбаланс, покращує рухливість і знижує біль.

Метою роботи було дослідження ефективності використання підвісної системи Redcord у лікуванні міофасціального больового синдрому (МФБС) шляхом активації глибоких м'язів, відновлення нейром'язового контролю та зменшення больового синдрому.

Проведено клінічне дослідження пацієнтів із міофасціальним больовим синдромом (МФБС), які пройшли реабілітацію з використанням системи Redcord. Дослідження тривало з вересня по грудень 2024 року у відділенні медичної реабілітації ННМК «Університетська лікарня» ХНМУ та включало оцінку болю, функціонального стану й м'язової активності до і після терапії.

Використання підвісної системи Redcord для лікування міофасціального больового синдрому (МБС) демонструє значну ефективність у зменшенні больових симптомів, покращенні функціональної рухливості та відновленні м'язової стабільності. У більшості пацієнтів спостерігалось значне зменшення інтенсивності болю після курсу Redcord-терапії. Середнє зниження больових відчуттів склало 60-80 % за шкалою візуальної аналогової шкали (VAS).

Отже, підвісна система Redcord є перспективним методом лікування міофасціального больового синдрому. Її використання сприяє активації глибоких м'язів, відновленню нейром'язового контролю та зменшенні болю. Необхідні подальші дослідження для визначення оптимальних протоколів терапії та підтвердження ефективності цього підходу у різних груп пацієнтів.

Ключові слова: міофасціальний больовий синдром, підвісна терапія, Redcord, нейром'язова активація, хронічний біль, реабілітація, функціональний

стан, м'язова дисфункція, стабілізація, фізична терапія.

Стаття надійшла в редакцію 05.02.2025 р.
Стаття прийнята до друку 18.03.2025 р.