

**INDICATORS OF THE FUNCTIONAL CAPACITY OF THE TISSUES
OF THE MAXILLO-FACIAL REGION, THE PSYCHOEMOTIONAL STATE
AND THE QUALITY OF LIFE OF PATIENTS WITH THE CONSEQUENCES
OF THE MANDIBULAR FRACTURE UNDER THE INFLUENCE
OF PHYSICAL THERAPY**

**ПОКАЗНИКИ ФУНКЦІОНАЛЬНОЇ ЗДАТНОСТІ ТКАНИН ЩЕЛЕПНО-ЛИЦЕВОЇ
ДЛЯНКИ, ПСИХОЕМОЦІЙНОГО СТАНУ ТА ЯКОСТІ ЖИТТЯ ХВОРИХ
З НАСЛІДКАМИ ПЕРЕЛОМУ НИЖНЬОЇ ЩЕЛЕПИ ПІД ВПЛИВОМ
ЗАСОБІВ ФІЗИЧНОЇ ТЕРАПІЇ**

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Abstracts

Purpose is to assess the effectiveness of the developed physical therapy program based on the dynamics of indicators of the functional capacity of maxillofacial tissue, psychoemotional state and quality of life of patients with the consequences of a mandibular fracture.

Material. During the research 77 people were examined. The control group consisted of 32 people without consequences of injuries of the maxillofacial area and burdened dental status. Group 1 consisted of 24 people who underwent rehabilitation according to the general principles of rehabilitation of patients with a dental profile. Group 2 consisted of 21 people with the consequences of a mandibular fracture, who underwent rehabilitation with the use of therapeutic exercises; massage; thermal procedures; postisometric relaxation; kinesiological taping; patient education. Effectiveness was evaluated based on the results of surface electromyography, Hospital Anxiety and Depression Scale, SF-36 questionnaire.

The results. In patients in the post-immobilization period after a mandibular fracture, signs of disturbances in the functional state of the neuromuscular apparatus were determined by changes in the amplitude of the bioelectric activity of the masticatory and temporal muscles at rest and when the jaws are maximally clenched in the position of habitual occlusion (according to surface electromyography data), psychoemotional suppression by type of anxiety and depression (according to the Hospital Anxiety and Depression Scale) and, as a result, deterioration of the physical and mental components of the quality of life (according to the SF-36). In patients who received an effect only on the peripheral component of the contracture of the temporomandibular joint (its mobility), a slight improvement in the indicators of bioelectric activity (temporal muscles when clenching the jaws) and certain components of the quality of life (on the scales of general health, vitality, role emotional, mental health) was determined ($p < 0.05$ relative to baseline values), but a decrease in psycho-emotional stress according to the Hospital Anxiety and Depression Scale was not determined ($p > 0.05$). All these diagnosed positive changes were less pronounced ($p < 0.05$) compared to the group that was engaged in the complex physical therapy program.

Conclusions. In the rehabilitation program of patients in the post-immobilization period after a fracture of the mandibular fracture, it is advisable to include measures taking into account and correcting not only dental changes, but also the consequences of damage to the tissues of the orofacial zone, neck, and which will improve not only the local condition of the tissues, but also their psycho-emotional status and quality of life.

Key words: bone fracture, post-immobilization period, physical therapy, rehabilitation in dentistry, maxillofacial region, traumatology.

Мета – оцінити ефективність розробленої програми фізичної терапії за динамікою показників функціональної здатності тканин щелепно-лицевої ділянки, психоемоційного стану та якості життя хворих з наслідками перелому нижньої щелепи.

Матеріал. У ході дослідження було обстежено 77 осіб. Контрольну групу становили 32 особи без наслідків травм щелепно-лицевої ділянки та обтяженого стоматологічного статусу. Групу 1 становили 24 особи, які проходили реабілітацію згідно із загальними принципами відновлення пацієнтів стоматологічного профілю. Групу 2 становила 21 особа з наслідками перелому нижньої щелепи, які проходили реабілітацію із застосуванням терапевтичних вправ; масажу; теплових процедур; постізометричної релаксації; кінезіологічного тейпування; навчання пацієнта. Ефективність оцінювали за результатами поверхневої електроміографії, Hospital Anxiety and Depression Scale, опитувальника SF-36.

Результати. У пацієнтів у постімобілізаційному періоді після перелому щелепи було визначено ознаки порушень функціонального стану нейром'язового апарату за змінами амплітуди біоелектричної активності жувального та скроневого м'язів у спокої та у разі максимального стискання щелеп у положенні звичної оклюзії (за даними поверхневої електроміографії), психоемоційного пригнічення по типу тривоги та депресії (за Hospital Anxiety and Depression Scale) та як результат – погіршення фізичного та психічного компонентів якості життя (за SF-36). У пацієнтів, які отримували вплив тільки на периферичний компонент контрактури скронево-нижньощелепного суглобу (його мобільність), визначено незначне покращення показників біоелектричної активності (скронево-вих м'язів у разі стискання щелеп) та окремих компонентів якості життя (за шкалами general health, vitality, role emotional, mental health) ($p < 0,05$ стосовно вихідних показників), але зменшення стану психоемоційного напруження за Hospital Anxiety and Depression Scale не було визначено ($p > 0,05$). Всі ці діагностовані позитивні зміни були менш виражені ($p < 0,05$) порівняно з групою, яка займалась за програмою комплексної фізичної терапії.

Висновки. У програму реабілітації пацієнтів у постімобілізаційному періоді після перелому нижньої щелепи доцільно включати заходи з урахуванням та корекцією не тільки стоматологічних змін, але й наслідків ураження тканин орофасіальної зони, шиї, що покращить не тільки локальний стан тканин, але й психоемоційний статус та якість їхнього життя.

Ключові слова: перелом кістки, постімобілізаційний період, фізична терапія, реабілітація у стоматології, щелепно-лицева ділянка, травматологія.

Introduction. Injuries of the facial bones occupy a special place among the fractures of the bones of the human skeleton due to their functional and cosmetic features. The frequency of injuries of the maxillofacial area and their severity are steadily increasing as the technology of society grows and social tension persists in it; on average, they make up to 16.5% of all peacetime injuries [4]. Among them, according to various authors, fractures of the mandibular fracture are diagnosed most often (70–87% of cases); at the same time, in recent years, the trend of the authors is an increase in the frequency of traumatic injuries of the maxillofacial area with a predominance of more severe forms [9; 10].

Increasing the effectiveness of complex rehabilitation of patients with injuries of the maxillofacial region is an urgent problem related not only to the state of peripheral tissues, but also to the dynamically changing state of psychophysiological functions of patients [13; 14]. The solution to this issue can be achieved by studying and

taking into account the neurophysiological and psychophysiological reactions of patients at various stages of providing specialized surgical and rehabilitative dental intervention.

Restoration of bone tissue in case of jaw fractures is a complex process due to the coordinated influence of central and local regulatory systems on the structural reconstruction of bone tissue in the area of damage [5; 7]. Taking into account the above, it is relevant and appropriate to create a program of a comprehensive rehabilitation program for patients with a mandibular fracture to increase the efficiency of their recovery process.

Long-term immobilization of the lower jaw contributes to the hypofunction of the muscles involved in chewing and, in most patients, causes atrophy of the masticatory muscles with a decrease in their size. A decrease in functional load reduces regional blood circulation, slows down bone remodelling, and directs the process of bone callus maturation towards the formation of cartilage tissue [11]. One of the ways to

increase the activity of osteoreparative processes is to activate the function of facial muscles by restoring their voluntary contraction [13]. The post-immobilization period after removing the splints is characterized by limitation of mobility in the temporomandibular joint (contracture), which worsens food consumption, psycho-emotional state, and quality of life [1; 15].

The use of physical therapy is a recognized highly effective method of rehabilitation of patients with post-immobilization structural and functional complications [5; 12], in particular, some studies examine dental dysfunctions [6; 7; 8; 13]. However, despite the prevalence of mandibular fracture and the rapid development of the rehabilitation service in Ukraine, not enough attention is paid to specific methods of rehabilitation of patients with both civilian and combat injuries of the maxillofacial area, which determined the relevance of the researched topic.

The purpose of the study is to evaluate the effectiveness of the developed physical therapy program based on the dynamics of indicators of the functional capacity of maxillofacial tissue, psychoemotional state and quality of life of patients with the consequences of a mandibular fracture.

Material and methods. During the research 77 people were examined.

The control group (CG) consisted of 32 people (18 men, 14 women) aged 34.5 ± 2.4 years without the consequences of injuries to the maxillofacial area and a burdened dental status (orthognathic bite, full set of teeth (excluding third molars), absence dysfunction of the temporomandibular joint (TMJ), orthopedic structures in the oral cavity).

The main group consisted of 45 people with the consequences of a mandibular fracture (post-mobilization period). The main group 1 (MG1) consisted of 24 people (17 men, 7 women) aged 30.2 ± 4.2 years) who underwent rehabilitation using preformed factors, therapeutic exercises, massage according to the general principles of restoration of patients of the dental profile with a recommendation to continue the correction of the post-immobilization contractures independently with the use of active inde-

pendent rotor expansion until the desired result is achieved and the use of local passive anti-inflammatory therapy with the help of preformed physical factors [7]. The main group 2 (MG2) consisted of 21 people (16 men, 5 women) aged 28.4 ± 3.1 years with the consequences of a mandibular fracture, who underwent rehabilitation according to the program, the effectiveness of which is presented in this study.

Criteria for inclusion in the study: consolidated uncomplicated mandibular fracture (angle, body) without displacement / with minimal displacement of bone fragments; the early post-immobilization period after conservative treatment – double-jaw splinting with Tigerstedt wire splints with hooks and intermaxillary rubber traction according to the Standard of Medical Care “Non-flammable fractures of the mandibular fracture (condylar process, ramus, angle, body and symphysis)” [7] and Clinical Guidelines based on evidence of “Injuries of the maxillofacial area” [8]; informed consent to participate in the study. Exclusion criteria: fracture of the mandibular fracture, combined with a severe craniocerebral injury; loss of more than half of the teeth of one jaw; the lower complicated course of the immobilization period; intra-articular process fractures; gunshot fractures; combination with fractures of other bones of the skull; multiple, multifragmentary, outdated, improperly consolidated fractures, with the presence of bone defects.

The developed program included therapeutic exercises for the chewing muscles, face, neck, neck-collar zone, back, shoulder girdle; a course of massage (intraoral and classic) of the masticatory muscles, TMJ, neck, cervical collar zone; thermal procedures (dry heat) on the TMJ area; postisometric relaxation of masticatory muscles, neck muscles; kinesiological taping of the TMJ area, masticatory muscles, neck; training (education) of the patient (taking soft food, limiting wide opening of the mouth, prolonged chewing, clenching of the jaws, conscious controlled correction of their incorrect motor stereotypes, elimination of harmful habits related to dental hygiene (clicking seeds, nuts, holding objects with the teeth, etc.)). The

rehabilitation program lasted three months; during the first intervention, it was carried out on the basis of the rehabilitation center, during the second – in a hybrid format (on the basis of the rehabilitation center, in the format of telerehabilitation, independently), during the third – in the form of telerehabilitation and independent classes with periodic monitoring. The purpose of the program was: restoration of the functional capacity of the mandibular and the orofacial zone as a whole (chewing, swallowing, speech, oral breathing, articulatory movements in full); increasing the amplitude of TMJ movement; minimization of traumatic and post-traumatic TMJ dysfunction; normalization of facial (chewing and facial) and neck muscle tone; levelling of trigger zones and myofascial disorders (face, neck, cervical collar zone); decrease in the degree of psycho-emotional stress; teaching the principles of gentle motor and functional load on the lower jaw; restoring the aesthetic symmetrical shape of the face.

The change in the functional state of the neuromuscular apparatus was determined using surface electromyography of the masticatory and temporal muscles at rest and when the jaws were maximally clenched in the position of habitual occlusion using the electromyograph M-TEST ONE 2.

Psychoemotional status was determined by the Hospital Anxiety and Depression Scale (HADS) differentiated by anxiety and depression subscales.

The general health-related quality of life was determined by the non-specific questionnaire SF-36 (The Short Form-36), which is characterized by scales of physical function (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social function (SF), role emotional (RE), mental health (MH).

The study was conducted taking into account the principles of the Helsinki Declaration of the World Medical Association “Ethical principles of medical research with the participation of a person as an object of research”. Informed consent was obtained from all patients with mandibular fracture consequences and healthy individuals involved in the present study. The research pro-

cedure was discussed and approved at the meeting of the Bioethics Commission of Vasyl Stefanyk Precarpathian National University.

Statistical processing of the results was carried out in the “Statistica 10” program. Arithmetic mean (M), standard deviation (S) and standard error of the mean (D) were calculated to describe the obtained quantitative characteristics. Differences at $p < 0.05$ were considered statistically significant.

Research results. Electromyographic examination of the temporal and masticatory muscles in the post-immobilization period after a mandibular fracture demonstrated higher bioelectrical activity at rest and during jaw clenching compared to the control group at rest, $p < 0.05$ (which could indicate the presence of spontaneous electrical bursts and complications during voluntary and involuntary muscle relaxation) (Table 1). The asymmetry of the right and left groups of facial muscles was also characteristic, which can be justified by the functional consequences of the injury and the use of more preserved parts of the mandibular during chewing and the specifics of the injuries.

Functional and structural consequences of trauma and immobilization led to psychoemotional changes in patients. According to the HADS scale, in all groups of people with the consequences of a mandibular fracture, the subclinical level of anxiety (MG1 – 8.29 ± 0.15 points, MG2 – 8.75 ± 0.30 points) and depression (MG1 – 9.22 ± 0.38 points, MG2 – 8.93 ± 0.25 points), in contrast to CG individuals, who were characterized by the absence of these signs ($p < 0.05$) (Table 2). A depressed psycho-emotional state is a predictor of deterioration of the quality of life and can reduce the effectiveness of rehabilitation.

The presence of post-immobilization changes adversely affected the overall quality of life – both its physical and mental components according to the SF-36 scale (Table 3). The consequences of immobilization negatively affected physical functioning: the quality of life according to the PF scale was low compared to the CG in both groups ($p < 0.05$), which can be associated with residual structural and functional changes. Role

functioning on the RP scale in individuals of the main groups was also impaired compared to CG ($p<0.05$). According to the BP scale, the consequences of a mandibular fracture were indicated by pain sensations, which can be clinically associated with a contracture of the temporomandibular joint, muscle weakness of the masticatory muscles, inflammatory and stagnant changes in the tissues of the oral cavity, etc., caused by the injury. General Health Scale parameters showed a statistically significant lower score in MG1 and MG2 individuals compared to CG individuals ($p<0.05$).

Low scores were also diagnosed on all SF-36 mental health quality of life scales. Consequences of trauma to the lower jaw were asso-

ciated with a general decrease in vitality and well-being – on the VT scale, patients demonstrated a low result compared to healthy individuals ($p<0.05$). According to the SF scale, during the initial examination, individuals of the main groups were lagging behind representatives of the CG ($p<0.05$), which testified to the negative impact of the consequences of immobilization of the lower jaw on social functioning. Worsened psycho-emotional background also led to deterioration of role-emotional functioning: on the RE scale in all groups compared to CG ($p<0.05$). When assessing their mental health in quality of life using the MH scale, individuals with trauma rated it as low, which is consistent with the results of the HADS scale.

Table 1

Indicators of the electromyographic study of the masticatory and temporal muscles in patients with a mandibular fracture in the post-immobilization period under the influence of rehabilitation measures ($M\pm SD$)

Studied muscle, μV	CG (n=32)	MG1 (n=24)		MG2 (n=21)	
		Pre-test	Post-test	Pre-test	Post-test
Average amplitude of bioelectrical activity at rest					
Right temporal	34.20 \pm 5.16	57.11 \pm 4.12*	50.08 \pm 5.12*	55.20 \pm 7.41*	39.15 \pm 4.21 ^{°*}
Left temporal	35.74 \pm 4.12	50.13 \pm 5.33*	46.13 \pm 5.08*	49.20 \pm 5.19*	38.09 \pm 3.16 [°]
Right masticatory	31.06 \pm 5.03	48.22 \pm 4.59*	44.29 \pm 6.45*	50.12 \pm 5.45*	37.22 \pm 4.09 [°]
Left masticatory	27.48 \pm 3.45	43.13 \pm 5.07*	42.15 \pm 4.96*	44.20 \pm 6.12*	33.67 \pm 5.18 [°]
Average amplitude of bioelectrical activity during jaw clenching in habitual occlusion					
Right temporal	180.46 \pm 11.25	362.45 \pm 13.40*	270.49 \pm 11.16 ^{°*}	354.12 \pm 9.82	201.30 \pm 11.49 ^{°*}
Left temporal	175.13 \pm 9.49	350.84 \pm 10.12*	264.68 \pm 9.46 ^{°*}	346.31 \pm 12.13	194.81 \pm 9.15 ^{°*}
Right masticatory	192.78 \pm 11.08	381.22 \pm 11.45*	331.21 \pm 15.43*	375.84 \pm 10.58	276.95 \pm 14.26 ^{°*}
Left masticatory	199.71 \pm 8.13	346.61 \pm 15.13*	328.11 \pm 10.18*	338.48 \pm 9.17	270.33 \pm 10.65 ^{°*}

Notes: * – $p<0.05$ – statistically significant difference between the corresponding parameters of CG and MG;

[°] – $p<0.05$ – statistically significant difference between the corresponding parameters during the initial and repeated examinations;

* – $p<0.05$ – statistically significant difference between the corresponding parameters of MG1 and MG2.

Table 2

Dynamics of HADS results in patients with a mandibular fracture in the post-immobilization period under the influence of rehabilitation measures ($M\pm SD$)

Scale, points	CG (n=32)	MG1 (n=24)		MG2 (n=21)	
		Pre-test	Post-test	Pre-test	Post-test
Anxiety	3.46 \pm 0.12	8.29 \pm 0.15*	8.07 \pm 0.09*	8.75 \pm 0.30*	4.88 \pm 0.39 ^{°*}
Depression	4.02 \pm 0.16	9.22 \pm 0.38*	8.90 \pm 0.26*	8.93 \pm 0.25*	5.76 \pm 0.23 ^{°*}

Notes: * – $p<0.05$ – statistically significant difference between the corresponding parameters of CG and MG;

[°] – $p<0.05$ – statistically significant difference between the corresponding parameters during the initial and repeated examinations;

* – $p<0.05$ – statistically significant difference between the corresponding parameters of MG1 and MG2.

Table 3

Dynamics of indicators of somatic quality of life according to SF-36 in patients with a mandibular fracture in the post-immobilization period under the influence of rehabilitation measures (M±SD)

Scale, points	CG (n=32)	MG1 (n=24)		MG2 (n=21)	
		Pre-test	Post-test	Pre-test	Post-test
PF	83.22±2.14	65.13±1.19*	70.23±2.65*	69.15±2.73*	85.12±1.88 ^{°*}
RP	85.15±3.22	70.16±2.20*	76.13±3.54*	73.28±1.62*	83.46±2.16 ^{°*}
BP	88.07±1.07	60.25±2.08*	67.23±3.28*	64.74±3.29*	77.49±2.40 ^{°*}
GH	80.12±5.38	62.07±4.15*	70.08±2.17 [°]	58.92±2.40*	79.14±1.59 ^{°*}
VT	79.23±2.46	58.19±2.45*	68.14±2.91 [°]	60.11±3.58*	76.12±1.67 ^{°*}
SF	90.15±1.14	75.42±1.75*	80.62±2.16*	71.58±2.04*	89.12±1.90 ^{°*}
RE	90.47±1.48	61.37±3.30*	70.56±1.49 [°]	63.40±4.12*	80.92±1.70 ^{°*}
MH	82.86±2.07	57.60±2.91*	65.89±2.04 [°]	61.75±3.19*	80.13±1.49 ^{°*}

Notes: * – p<0.05 – statistically significant difference between the corresponding parameters of CG and MG;

[°] – p<0.05 – statistically significant difference between the corresponding parameters during the initial and repeated examinations;

* – p<0.05 – statistically significant difference between the corresponding parameters of MG1 and MG2.

The primary examination proved the homogeneity of the contingent of persons with the consequences of a mandibular injury (the studied parameters in MG1 and MG2 were not statistically significantly different from each other), which made it possible to determine the effectiveness and compare the applied means of rehabilitation intervention.

The analysis of repeated electromyography proved that a statistically significant improvement in electrical activity relative to the initial result was achieved only in the MG2 group, which demonstrates the benefits of active functional training and therapeutic exercises of the muscles of the orofacial zone. In this group, the improvement (p<0.05) relative to the initial indicator of the electrical activity at rest of the right temporal muscle was 21.9%, the left – 22.6%, the right masseter muscle – 25.7%, the left 23,8%; at the same time, the difference between the indicators of both sides of the face was minimized (Table 1). The dynamics of the average amplitude of bioelectrical activity when clenching the jaws in habitual occlusion was characterized by similar trends: the improvement in the activity of the right temporal muscle was 43.2%, the left – 43.7%, the right masseter – 26.3%, the left masseter – 20.1%. An improvement in the bioelectrical activity of the masticatory muscles was associated with an improvement in the func-

tioning of the orofacial zone, as presented in our previous study [1].

Re-determination of the psycho-emotional status of persons with mandibular trauma proved that the rehabilitation program, created only from the positions of mobilization of the temporomandibular joint, did not affect their psycho-emotional state, characterized by the HADS: on the scales of anxiety and depression in the MG1 group, there were no statistically significant changes relative to initial data (p>0.05); the severity of symptoms of anxiety and depression remained at a preclinical level. At the same time, under the influence of the rehabilitation, the level of anxiety in MG2 individuals decreased from 8.75±0.30 points to 4.88±0.39 points (p<0.05). The positive dynamics of depression scale indicators in MG2 individuals was from 8.93±0.25 points to 5.76±0.23 points (p<0.05). The level of CG on both HADS scales was not reached in (p<0.05). The improvement of the psycho-emotional state can be associated with a reduction in pain and discomfort, and an improvement in the functioning of the maxillofacial area [1].

Corrective measures had a diverse impact on the quality of life according to SF-36 (Table 3). Physical functioning on the PF scale at re-examination in the MG1 group did not change, while in MG2 its improvement was noted from 69.15±2.73 points to 85.12±1.88 points (p<0.05)

having reached the CG level. Role functioning also underwent positive changes: the dynamics on the RF scale was from 73.28 ± 1.62 points to 83.46 ± 2.16 points ($p < 0.05$).

According to the BP scale, pain sensations decreased in both main groups, in particular, due to the physiological course of healing, but the positive dynamics in MG2 was more pronounced: from 64.74 ± 3.29 points to 77.49 ± 2.40 .

As a result of the implementation of the physical therapy program, OG patients noted a general improvement in their health: according to the GH scale, the improvement in people with DB was from 58.92 ± 2.40 points to 79.14 ± 1.59 points ($p < 0.05$), reaching the level of CG individuals ($p > 0.05$).

Well-being on the VT scale, in contrast to MG1, significantly improved in MG2 individuals, which can be explained by the complex impact of the developed program: from 60.11 ± 3.58 points to 76.12 ± 1.67 points ($p < 0.05$).

Improvement of social functioning was determined in MG2 individuals – the SF scale index increased from 71.58 ± 2.04 points to 89.12 ± 1.90 points ($p < 0.05$).

Improvement of role-emotional functioning as a result of improvement of psycho-emotional state and well-being according to the RE scale in MG2 individuals from 63.40 ± 4.12 points to 80.92 ± 1.70 points ($p < 0.05$), reaching the level of CG representatives ($p > 0.05$).

Measures to mobilize the temporomandibular joint and the lower jaw did not lead to a significant improvement in the mental state of MG1 individuals relative to the initial level ($p > 0.05$); instead, the improvement in MG2 was significant and on the MH scale was from 61.75 ± 3.19 points to 80.13 ± 1.49 points ($p < 0.05$).

Analyzing the obtained data, it should be noted the higher efficiency of the complex program of physical therapy compared to joint mobilization, especially from the standpoint of the complex concept of quality of life.

Discussion. The clinical picture of mandibular fracture before the intervention is characterized by pain syndrome, displacement and mobility of fragments, visible deformation of the maxillofacial region is observed, there are changes in the

function of the temporomandibular joints and masticatory muscles, bite and articulation, speech and chewing, which will cause directions of further treatment and rehabilitation [2; 3; 7]. With uncomplicated fractures and timely treatment, the integrity of the bone and the function of the lower jaw are restored within a month, determining the duration of immobilization, during which rehabilitation intervention in the conditions of a hospital or outpatient clinic is not actually carried out. Fractures of the branch and condyle of the mandibular can cause persistent morphological and functional disorders, including those of the masticatory muscles [7]. The problems associated with the treatment of functional disorders of the TMJ and masticatory muscles are recognized as very complex and important, requiring further research [4; 9]. Defects of dental rows complicate the development of post-traumatic morphofunctional changes of the TMJ. Not all patients undergo orthopedic treatment after removal of the splinting structures, which aggravates existing morphological, functional and aesthetic disorders in the maxillofacial area. Therefore, in the treatment of patients with fractures of the lower jaw, comprehensive (orthopedic and physical) rehabilitation is required, aimed not only at the consolidation of bone tissue, but also at the restoration of the anatomical integrity and function of the tooth rows, the function of chewing and speech [1; 7; 8; 13].

Means of physical therapy have a high level of evidence regarding post-traumatic and post-immobilization changes in muscle and joint tissues, therefore they are widely used in traumatology [1; 5]. They are characterized by a physiological focus on motor function; have an anti-inflammatory, analgesic effect, improve local blood circulation and reduce stagnant processes [7; 8]. This causes a decrease in the intensity of post-immobilization changes in the musculoskeletal system, in particular, the temporomandibular area.

The use of physical therapy from the standpoints of the International Classification of Functioning, Disability and Health makes it possible to direct the goals of the recovery process in a multidisciplinary team with the participation of dental professionals towards the recovery of

indicators of the “Participation” domain. Taking into account the active functional load on the orofacial area during eating, communication, aesthetic perception of the face in society, there is a need for the use of appropriately targeted rehabilitation tools, and not just the mechanical comparison of bone fragments. This reduces the intensity of the clinical consequences of immobilization, improves the quality of life, which was confirmed in our study.

Conclusions.

1. In patients in the post-immobilization period after a mandibular fracture, signs of functional state of the neuromuscular apparatus were determined by changes in the amplitude of the bioelectric activity of the masticatory and temporal muscles at rest and when the jaws were maximally clenched in the position of habitual occlusion (according to surface electromyography data), psycho-emotional suppression by the type of anxiety and depression (according to the Hospital Anxiety and Depression Scale) and, as a result, the deterioration of the physical and mental components of the quality of life (according to the SF-36).

2. In patients who received an effect only on the peripheral component of the contracture of the temporomandibular joint (its mobility), a slight improvement in indicators of bioelectric activity (temporal muscles when clenching the jaws) and certain components of the quality of life (on the scales of general health, vitality, role emotional, mental health) ($p < 0.05$ relative to the initial indicators), but a decrease in psycho-emotional stress according to the Hospital Anxiety and Depression Scale was not determined ($p > 0.05$). All these diagnosed positive changes were less pronounced ($p < 0.05$) compared to the group that was engaged in the complex physical therapy program.

3. In the rehabilitation program of patients in the post-immobilization period after a mandibular fracture, it is advisable to include measures that take into account and correct not only dental changes, but also the consequences of damage to the tissues of the orofacial zone, neck, and that will improve not only the local condition of the tissues, but also their psycho-emotional status and quality life.

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