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<https://orcid.org/0000-0003-0059-9183>

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tibbiyot fanlari doktori, professor, Samarqand davlat tibbiyot universiteti 2-sonli ichki kasalliklar va kardiologiya kafedrasini mudiri, Samarqand viloyati vrachlar uyushmasi raisi
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tibbiyot fanlari doktori, "akad V. Vohidov nomidagi RIJM davlat institutining mikrobiologiya guruhi bilan biokimyo kafedrasini mudiri" <https://orcid.org/0000-0002-9942-2910>

TAHRIRIYAT A'ZOLARI:

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O'zbekiston Respublikasi Fanlar akademiyasining akademigi, tibbiyot fanlari doktori, professor, O'zbekiston Terapevtlar uyushmasi raisi, Respublika ixtisoslashtirilgan ilmiy va amaliy tibbiy terapiya markazi va tibbiy reabilitatsiya direktori maslahatchisi (Toshkent), <https://orcid.org/0000-0002-0933-4993>

Bockeria Leo Antonovich

Rossiya fanlar akademiyasining akademigi, tibbiyot fanlari doktori, professor, A.N. Bakuleva nomidagi yurak-qon tomir jarrohligi ilmiy markazi prezidenti (Moskva)
<https://orcid.org/0000-0002-6180-2619>

Kurbanov Ravshanbek Davlatovich

O'zbekiston Respublikasi Fanlar akademiyasining akademigi, tibbiyot fanlari doktori, professor, Respublika ixtisoslashtirilgan kardiologiya ilmiy-amaliy tibbiyot markazining direktor maslahatchisi (Toshkent)
<https://orcid.org/0000-0001-7309-2071>

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<https://orcid.org/0000-0002-0812-6113>

Pokushalov Evgeniy Anatolevich

tibbiyot fanlari doktori, professor, "Yangi tibbiy texnologiyalar markazi" (YTTM) klinik tarmog'ining ilmiy ishlar va rivojlanish bo'yicha bosh direktorining o'rinbosari (Novosibirsk) <https://orcid.org/0000-0002-2560-5167>

Zufarov Mirjamol Mirumarovich

tibbiyot fanlari doktori, professor, "akad V. Vohidov nomidagi RIJM davlat muassasasi" bo'limi boshlig'i"
<https://orcid.org/0000-0003-4822-3193>

Akilov Xabibulla Ataulayevich

tibbiyot fanlari doktori, professor, Tibbiyot xodimlarining kasbiy malakasini oshirish markazi direktori (Toshkent)

Nasirova Zarina Akbarovna

Samarqand davlat tibbiyot universiteti 2-sonli ichki kasalliklar va kardiologiya kafedrasini dotsenti, DSc (mas'ul kotib) ORCID: 0000-0002-8722-0393 (mas'ul kotib)

Rizayev Jasur Alimjanovich

tibbiyot fanlari doktori, professor, Samarqand davlat tibbiyot universiteti rektori
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tibbiyot fanlari doktori, professor, Toshkent shahridagi Kimyo xalqaro universitetining Samarqand filiali direktorining akademik faoliyat bo'yicha birinchi o'rinbosari (Toshkent)
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Jan Kovak

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tibbiyot fanlari doktori, professori I.M. Sechenov nomidagi Birinchi Moskva Davlat tibbiyot universiteti (Moskva)
<https://orcid.org/0000-0001-8040-3704>

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Tibbiyot fanlari doktori, Profilaktik kardiologiya laboratoriyasi mudiri, YuIK va ateroskleroz laboratoriyasining yetakchi ilmiy xodimi. Respublika ixtisoslashtirilgan kardiologiya ilmiy-amaliy tibbiyot markazi (Toshkent)
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Doctor of Medical Sciences, Head of the Laboratory of Preventive Cardiology, Leading Researcher of the Laboratory of IHD and Atherosclerosis. Republican Specialized Scientific and Practical Medical Center of Cardiology (Tashkent) ORCID- 0000-0003-4339-0670

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Doniyorova Farangisbonu Alisher qizi
Toshkent Davlat tibbiyot universiteti
nevrologiya va xalq tabobati kafedrasida
dotsenti, DSc.
<https://orcid.org/0009-0004-4140-4797>

Alimov Doniyor Anvarovich
tibbiyot fanlari doktori, Respublika
shoshilinch tibbiy yordam ilmiy
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Abdullayev Akbar Xatamovich
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tibbiyot markazi" davlat
muassasasi bosh ilmiy xodimi
<https://orcid.org/0000-0002-1766-4458>

Agababayan Irina Rubenovna
tibbiyot fanlari nomzodi, dotsent,
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Samarqand davlat tibbiyot instituti

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tibbiyot fanlari doktori, professor,
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mudiri (Toshkent)

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tibbiyot fanlari nomzodi, dotsent,
Samarqand davlat tibbiyot instituti
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tibbiyot kafedrasida mudiri (Samarqand)

Shodiqulova Gulandom Zikriyevna
tibbiyot fanlari doktori, professor,
Samarqand davlat tibbiyot instituti 3-
ichki kasalliklar kafedrasida mudiri
(Samarqand)
<https://orcid.org/0000-0003-2679-1296>

Doniyorova Farangisbonu Alisher qizi
dozent kafedrasida nevrologiya va
xalq tabobati kafedrasida dotsent,
DSc. Toshkent Davlat tibbiyot
universiteti, davlat tibbiyot instituti
nevrologiya va xalq tabobati kafedrasida
dotsenti, DSc.
<https://orcid.org/0009-0004-4140-4797>

Alimov Doniyor Anvarovich
Doctor of Medical Sciences, Director of
the Republican Scientific Center of
Emergency Medical Care

Abdullaev Akbar Xatamovich
Doctor of Medical Sciences,
Chief Researcher of the State Institution
"Republican Specialized Scientific and
Practical Medical Center for Therapy and
Medical Rehabilitation" of the Ministry of
Health of the Republic of Uzbekistan,
<https://orcid.org/0000-0002-1766-4458>

Agababayan Irina Rubenovna
PhD, Associate Professor, Head of the
Department of Therapy, FAGE,
Samarkand State Medical Institute

Alieva Nigora Rustamovna
Doctor of Medical Sciences, Head of the
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doctor of Medical Sciences, Professor,
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Kamalov Zaynitdin Sayfutdinovich
doctor of Medical Sciences, Professor,
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of the Academy of Sciences of the
Republic of Uzbekistan

Kayumov Ulug'bek Karimovich
Doctor of Medical Sciences, Professor,
Head of the Department of Internal
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of medical workers

Khusinova Shoira Akbarovna
PhD, Associate Professor, Head of the
Department of General Practice,
Family Medicine FAGE of the
Samarkand State Medical Institute

Shodiqulova Gulandom Zikriyevna
Doctor of Medical Sciences, professor,
head of the Department of Internal
Diseases N 3 of Samarkand state medical
institute (Samarkand)
<https://orcid.org/0000-0003-2679-1296>

Doniyorova Farangisbonu Alisher qizi
Associate Professor, Department of
Neurology and Traditional Medicine,
Tashkent State Medical University, DSc.
<https://orcid.org/0009-0004-4140-4797>

Халиков Каххор Мирзаевич
кандидат медицинских наук, доцент
заведующий кафедрой биологической
химии Самаркандского
государственного медицинского
университета

Тулабаева Гавхар Миракбаровна
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Амануллаевич**

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медицинский институт имени Абу
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медицинских наук, профессор.

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Ассистент кафедры внутренних
болезней и кардиологии №2
Самаркандского государственного
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(технический секретарь)

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Ассистент кафедры внутренних
болезней и кардиологии №2
Самаркандского государственного
медицинского университета
(технический секретарь)

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kardiologiya kafedrasini mudiri, tibbiyot
xodimlarining kasbiy malakasini rivojlantirish
markazi, tibbiyot fanlari doktori, professor

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tibbiyot oliygohi» Xirurgiya kasalliklari va
reanimatsiya kafedrasini professori, tibbiyot
fanlari doktori.

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tibbiyot fanlari nomzodi,
Respublika ixtisoslashgan kardiologiya
ilmiy amaliy tibbiyot markazi Samarqand
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ichki kasalliklar va kardiologiya kafedrasini
assistenti (texnik kotib)

Esankulov Muxammad Olimovich

Samarqand davlat tibbiyot universiteti 2-son
ichki kasalliklar va kardiologiya kafedrasini
assistenti (texnik kotib), PhD

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Associate Professor, Head of the Department
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Medical University

Tulabayeva Gavxar Mirakbarovna

Head of the Department of Cardiology,
Development Center professional
qualification of medical workers,
MD, professor

**Abdumadjidov Khamidulla
Amanullayevich**

“Bukhara state medical institute named
after Abu Ali ibn Sino”. DSc, professor.

Saidov Maksud Arifovich

Candidate of Medical Sciences, Director
of the Samarkand Regional Department of
the Republican Specialized Scientific and
Practical Medical Center of Cardiology
(Samarkand)

Srojidinova Nigora Zaynutdinovna

DSc, Head of Kardiodiabetes and Metabolic
Disorders Laboratory

Dilangiz Akbarovna Nosirova,

Assistant of the Department of Internal
Diseases and Cardiology No. 2, Samarkand
State Medical University (Technical Secretary)

Esankulov Muhammad Olimovich,

Assistant of the Department of Internal
Diseases and Cardiology No. 2, Samarkand
State Medical University (Technical Secretary)

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Валиева Ф.С.

Ассистент кафедры челюстно-лицевой хирургии
Самаркандского государственного медицинского университета
Самарканд, Узбекистан

РОЛЬ ФИЗИОТЕРАПИИ В КОМПЛЕКСНОМ ЛЕЧЕНИИ БОЛЕВОЙ ДИСФУНКЦИИ ВИСОЧНО-НИЖНЕЧЕЛЮСТНОГО СУСТАВА У БОЛЬНЫХ С ПЕРЕЛОМАМИ НИЖНЕЙ ЧЕЛЮСТИ

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Аннотация

Статистические данные о переломах челюсти являются значимым элементом изучения данной патологии, поскольку требуют детального анализа с позиций эпидемиологии и влияния на систему здравоохранения. На основании многочисленных научных исследований и статистических сведений, представленных медицинским сообществом, можно обозначить несколько ключевых положений, характеризующих данную проблему. Прежде всего, распространённость переломов челюсти оказывается значительно выше, чем может предполагаться изначально. Данная патология занимает существенное место в общей структуре травматических повреждений и представляет собой серьёзную медико-социальную проблему. Особую актуальность этот вопрос приобретает в условиях роста числа дорожно-транспортных происшествий, производственных травм и иных факторов, способствующих повреждению челюстно-лицевой области. Кроме того, переломы челюсти встречаются у пациентов различных возрастных категорий и не имеют строгих возрастных ограничений. В этой связи особого внимания заслуживает роль физиотерапии в структуре комплексного лечения болевого дисфункционального синдрома височно-нижнечелюстного сустава, развивающегося у пациентов с переломами челюсти.

Ключевые слова: Физиотерапия, височно-нижнечелюстной сустав, переломы челюсти, болевая дисфункция, лечение, осложнения, противопоказания.

Valieva F.S.,

Assistant Teacher Department of Maxillofacial Surgery,
Samarkand State Medical University
Samarkand, Uzbekistan

THE ROLE OF PHYSIOTHERAPY IN THE COMPREHENSIVE TREATMENT OF PAINFUL TEMPOROMANDIBULAR JOINT DYSFUNCTION IN PATIENTS WITH MANDIBULAR FRACTURES

Annotation

Jaw fracture statistics constitute an important component in the study of this medical pathology, as they require thorough evaluation from the standpoint of epidemiology and their impact on public health. Drawing on numerous scientific studies and statistical reports published by the medical community, several key points can be highlighted in this field. First, the prevalence of jaw fractures is considerably greater than it may initially appear. They account for a substantial share of the overall pattern of traumatic injuries and therefore represent a significant healthcare concern. This issue is particularly relevant in the setting of a growing number of road traffic accidents, occupational injuries, and other circumstances that contribute to maxillofacial trauma. Second, jaw fractures are not confined to any specific age category and may occur across a wide range of age groups. In this context, special attention should be given to the role of physiotherapy in the comprehensive management of temporomandibular joint pain dysfunction syndrome in patients with jaw fractures.

Key words: Physiotherapy, temporomandibular joint, jaw fractures, pain dysfunction, treatment, complications, contraindications.

Valiyeva F.S.

Samarqand Davlat Tibbiyot Universitetining
yuz-qovg'a jarrohligi kafedrasi assistenti
Samarqand, O'zbekiston

PASTKI JAG' SINISHLARI BO'LGAN BEMORLARDA CHAKKA-PASTKI JAG' BO'G'IMI OG'RIQLI DISFUNKSIYASINI KOMPLEKS DAVOLASHDA FIZIOTERAPIYANING O'RNI

Annotatsiya

Jag' sinishlari statistikasi mazkur patologiyani o'rganishning muhim yo'nalishlaridan biri hisoblanadi, chunki uning epidemiologik

xususiyatlari hamda sog'liqni saqlash tizimiga ta'siri atroflicha tahlil qilishni talab etadi. Tibbiyot sohasida e'lon qilingan ko'plab tadqiqotlar va statistik ma'lumotlar ushbu muammoga doir bir qator ahamiyatli jihatlarni ajratib ko'rsatish imkonini beradi. Avvalo, jag' sinishlarining uchrash chastotasi ortib borayotgani kuzatilmoqda. Ular travmatik shikastlanishlar umumiy tarkibida salmoqli o'rin egallab, dolzarb tibbiy-ijtimoiy muammo sifatida namoyon bo'lmoqda. Ayniqsa, yo'l-transport hodisalari, ishlab chiqarish bilan bog'liq jarohatlar hamda jag' sohasining shikastlanishiga olib keluvchi boshqa omillar soni ortib borayotgan sharoitda bu masalaning ahamiyati yanada kuchaymoqda. Shuningdek, jag' sinishlari ma'lum bir yosh toifasi doirasida cheklanmaydi, ya'ni turli yoshdagi shaxslarda uchrashi mumkin. Fizioterapiya esa jag' sinishlari bilan bog'liq og'riqli disfunktsiya sindromini bartaraf etishda hamda kompleks davolash chora-tadbirlarini samarali tashkil etishda muhim o'rin tutadi.

Kalit so'zlar: Fizioterapiya, vena pastki jagsimon bo'g'imi, jag' sindirishi, og'riqli disfunktsiya, davolash, asoratlar, qarshi ko'rsatmalar.

Introduction. Statistics on jaw fractures constitute an important area in the study of medical pathology, requiring careful analysis from the perspectives of epidemiology and public health burden. Based on numerous investigations and statistical data reported by the medical community, several major aspects of this issue can be distinguished. First, the occurrence of jaw fractures is considerably more common than it may appear at first glance. These injuries account for a substantial proportion of the overall spectrum of traumatic conditions and therefore represent a serious challenge for healthcare systems. This is particularly relevant in the context of the growing number of road traffic accidents, occupational injuries, and other circumstances that contribute to maxillofacial trauma. Second, jaw fractures are not confined to a particular age category. They may occur in individuals of various ages, from children to older adults. Accordingly, this condition should be regarded as a multifactorial medical problem that requires a broad and comprehensive therapeutic approach. In addition, statistical data also demonstrate sex-related differences in the incidence of jaw fractures. Men are generally more prone to such injuries, which is partly associated with greater involvement in hazardous occupations, physical activities, and sports. At the same time, with the increasing participation of women in active and high-risk spheres of life, the frequency of jaw fractures among women has also shown a tendency to rise. Taken together, these factors emphasize the importance of developing effective measures for the prevention, early diagnosis, and treatment of jaw fractures, as well as the need for further research aimed at reducing the overall public health burden of this pathology.

Research objective. The Role of Physiotherapy in the комплекс treatment of Temporomandibular Joint Pain Dysfunction Syndrome in Patients with Jaw Fractures.

Materials and Methods of Research. The effect of traumatic jaw fractures on patients' quality of life represents a complex and multidimensional medical problem that warrants thorough investigation. Such injuries may exert a prolonged and pronounced influence on multiple aspects of a patient's life, affecting both physical health and psychological well-being. The primary objective of this review is to systematize and critically evaluate the available scientific evidence in order to determine the effectiveness of physiotherapeutic interventions in the management of painful temporomandibular joint dysfunction in patients with jaw fractures. The physical consequences of traumatic jaw fractures are frequently associated with impaired maxillofacial function. These impairments may present as difficulties with mastication, speech, and alterations in facial appearance, which can negatively influence self-esteem and confidence. In addition, pain accompanying the fracture may further worsen the patient's general physical condition. The psychological burden of such traumatic injuries can also be considerable. Patients often experience emotional distress related to the painful nature of the trauma and the prolonged rehabilitation period. Potential psychological outcomes may include anxiety, depressive symptoms, and social withdrawal, particularly in cases where visible changes in appearance are present. The social dimension of this condition should likewise be considered. Limitations in routine daily functioning may adversely affect professional activity, social engagement, and interpersonal relationships. Recovery after jaw fractures often requires substantial time and resources, frequently leading to modifications in lifestyle and future plans. Therefore, a comprehensive understanding of the influence of traumatic jaw fractures on quality of life highlights the necessity of developing integrated and multidisciplinary treatment and rehabilitation strategies that address not only physical restoration, but also the psychological, social, and overall quality-of-life needs of patients. In several studies, pain intensity and the requirement for analgesic medication were

assessed using a scale ranging from 0, indicating no pain, to 4, indicating unbearable pain. Treatment efficacy was evaluated according to analgesic demand and categorized as excellent, when no medication was required; good, when the need for analgesics decreased by more than 50%; satisfactory, when the reduction was less than 50%; and unsatisfactory, when no measurable effect was observed. Findings from somatosensory investigations provide valuable information for assessing therapeutic outcomes in patients with temporomandibular joint pain dysfunction associated with jaw fractures. Jaw fractures may significantly affect the temporomandibular joint and contribute to the development of pain and functional disturbances. The mechanical effect of fractures can alter joint alignment and disrupt normal biomechanical function, thereby provoking pain. Furthermore, trauma may involve the surrounding muscles and ligaments responsible for TMJ stabilization, resulting in both dysfunction and painful symptoms. Fractures may also disrupt the innervation of the maxillofacial region, resulting in heightened nerve fiber sensitivity and weakened transmission of pain impulses. Surgical procedures, including fixation with plates and screws, may additionally influence the temporomandibular joint and its functional state, thereby contributing to the development of painful dysfunction. Furthermore, psychosocial factors such as stress, anxiety, and depressive states may significantly affect pain perception and tolerance in patients suffering from temporomandibular joint dysfunction following jaw fractures. In this regard, a comprehensive approach that considers anatomical, physiological, surgical, and psychosocial determinants is essential for the accurate diagnosis and effective management of patients with jaw fractures complicated by painful temporomandibular joint dysfunction. Pain manifestations associated with jaw fractures and painful temporomandibular joint dysfunction may arise through multiple pathogenic mechanisms. Inflammatory reactions and edema in the area of damaged tissues can activate nociceptors and nerve endings, thereby provoking pain. Mechanical disturbances, including displacement and deformation of articular surfaces, may lead to abnormal loading and stress within joint structures, which also contributes to pain development. Damage to periarticular soft tissues, such as muscles, ligaments, and tendons, represents another important source of pain. In addition, vascular injury may promote inflammatory responses and intensify painful symptoms. Neuropathic pain may likewise develop as a consequence of nerve injury caused either by the fracture itself or by surgical intervention. Painful temporomandibular joint dysfunction may also be accompanied by alterations in muscle tone and muscular performance, which further aggravate pain in the jaw and joint region. At the same time, psychosocial influences, including stress, anxiety, and depression, may amplify subjective pain perception. Therefore, understanding these pathogenic mechanisms is of fundamental importance for the development of effective strategies aimed at pain relief and restoration of temporomandibular joint function after jaw fractures. Current therapeutic approaches to the treatment of temporomandibular joint pain and dysfunction in patients with jaw fractures remain limited due to the individual characteristics of each patient, which complicates the creation of a unified standardized treatment protocol. The multifactorial nature of this condition, in which numerous contributing factors participate in the development of dysfunction, indicates that existing treatment strategies may not always be sufficient to address all clinical aspects of the disorder. In addition, there is still a lack of universally accepted treatment standards, as well as limited diagnostic tools for the assessment of painful temporomandibular joint dysfunction. The effectiveness of physical therapy in this context remains insufficiently established, primarily due to the limited number of studies providing strong evidence of its clinical value. Successful management of this

condition often necessitates a multidisciplinary approach that combines surgical intervention, pharmacological treatment, physiotherapy, and psychological support. However, inadequate coordination among specialists may reduce the overall effectiveness of such comprehensive care. Addressing these limitations requires further scientific investigation, the development of innovative diagnostic and therapeutic strategies, and stronger interdisciplinary collaboration among healthcare professionals. At the same time, physical therapy represents a fundamental component in the management of temporomandibular joint pain and dysfunction following jaw fractures. It contributes to pain reduction through the application of therapeutic modalities such as ultrasound, thermotherapy, electrotherapy, and massage techniques. Furthermore, physiotherapeutic interventions facilitate the restoration of joint function by strengthening the musculature, improving joint mobility, and correcting functional disturbances in the affected structures. To address muscular imbalance in the facial and cervical regions, targeted exercises and specialized therapeutic techniques are employed. Exercises aimed at improving mobility and coordination assist patients in regaining control over mandibular movements, which is essential for the restoration of normal mastication and speech. Relaxation techniques and massage additionally help alleviate stress and muscle tension in the temporomandibular joint region. Patient education, together with instruction in self-massage techniques, also forms an important part of physiotherapy, as it supports the continuation and maintenance of treatment outcomes in the home setting. Moreover, physical therapy may be effectively combined with other therapeutic modalities, including pharmacotherapy, surgical treatment, and psychotherapy, thereby forming an integrated and comprehensive rehabilitation strategy. The role of physical therapy thus underscores the importance of a multifactorial approach to the treatment of painful temporomandibular joint dysfunction after jaw fractures. Physical therapy, also referred to as physical rehabilitation, plays a central role in the effective management of temporomandibular joint pain and dysfunction in patients with jaw fractures. The application of this method requires a high degree of individualization, with careful consideration of the specific clinical characteristics and needs of each patient.

Results and Discussions. For achieving optimal therapeutic outcomes, targeted exercise therapy constitutes an essential component of physiotherapy, as it promotes the restoration of joint mobility and enhances muscular strength. Massage and relaxation techniques are also widely employed to alleviate pain and improve local blood circulation in the temporomandibular joint region. Thermotherapy represents another important element of rehabilitation, contributing to pain relief and reduction of inflammatory processes in the periarticular tissues. In contrast, electrotherapy is used to stimulate muscular activity and improve joint function, thereby creating favorable conditions for recovery. Furthermore, patient education plays a substantial role in successful rehabilitation by providing individuals with the knowledge and practical skills necessary to continue therapeutic measures independently at home. Thus, physiotherapy should be regarded as a comprehensive therapeutic approach in the management of painful temporomandibular joint dysfunction, ensuring not only symptomatic relief, but also restoration of joint function and reduction in pain intensity. Physical therapy is an indispensable component of the комплекс management of temporomandibular joint pain and dysfunction following jaw fractures. Specialized strengthening exercises occupy a central place in rehabilitation, as they are directed toward restoration of muscle tone and improvement of joint stability. These exercises primarily involve the masticatory muscles, cervical and facial musculature, as well as the muscle groups responsible for mandibular movements. Massage and manual therapy techniques are likewise actively incorporated into the treatment process. Massage of the facial muscles contributes to relaxation of hypertonic tissues and reduction of pain. Manual therapy of the joint includes gentle manipulative methods aimed at restoring normal mobility and correcting functional imbalances. Trigger point therapy is used to reduce muscular spasm, whereas stretching and mobilization techniques improve the range of motion of the joint. The combination of strengthening exercises, massage modalities, and manual therapeutic

methods provides an individualized approach to the restoration of joint function in patients with painful temporomandibular joint dysfunction. Such a comprehensive strategy allows optimal therapeutic outcomes to be achieved and ensures effective rehabilitation in patients presenting with similar clinical conditions. Electrotherapy and ultrasound therapy also represent essential components of physiotherapeutic management in patients with painful temporomandibular joint dysfunction and during recovery after jaw fractures. Techniques such as transcranial electrical stimulation, interferential stimulation, and transcranial continuous electrical stimulation are aimed at modulating neural activity, enhancing muscle activation, and decreasing pain intensity. Ultrasound therapy includes the use of low-intensity ultrasound to stimulate tissue repair and improve microcirculation, while high-intensity ultrasound is applied to reduce muscle tension and relieve pain. The combined use of these modalities may effectively decrease pain symptoms, improve joint mobility, and accelerate reparative processes. Therefore, electrotherapy and ultrasound therapy are valuable tools in physiotherapeutic practice, enabling specialists to address multiple aspects of temporomandibular joint pain dysfunction, including muscular activity, inflammatory changes, and limitations in joint mobility. Within the framework of the comprehensive treatment of temporomandibular joint pain dysfunction developing after jaw fractures, special attention should be given to the contribution of each physiotherapeutic modality. This issue is of particular importance because rehabilitation programs include a broad range of techniques, each directed toward specific aspects of pain control and restoration of joint function. First, particular emphasis should be placed on the fundamental role of muscle-strengthening exercises. Such exercises are essential for restoring muscular tone, especially in the masticatory, facial, and cervical muscle groups, thereby contributing to the correction of muscular imbalance and the improvement of joint stability. This approach is aimed not only at local functional recovery, but also at the normalization of overall joint biomechanics. In addition, massage and manual therapy represent integral components in the management of pain and the restoration of joint mobility. When specifically applied to the facial muscles and temporomandibular joint structures, these methods promote muscle relaxation and correction of dysfunctional movement patterns, thereby exerting a beneficial influence on the patient's general condition and well-being. The therapeutic value of transcranial electrical stimulation and ultrasound therapy lies in their targeted effects on tissue regeneration and the reduction of inflammatory changes. The incorporation of all these therapeutic modalities into a unified physiotherapy program forms the basis for achieving optimal clinical outcomes. Such an integrated strategy takes into account the multiple components of temporomandibular joint pain dysfunction, ensuring a broad therapeutic effect on muscles, joint components, and neural structures, and thereby facilitating more complete recovery. A variety of criteria may be applied to assess the effectiveness of physiotherapy in the treatment of painful temporomandibular joint dysfunction after jaw fractures. These criteria include reduction in pain intensity, improvement in joint mobility, restoration of masticatory function, decrease in inflammatory manifestations, enhancement of muscle tone and strength, patient satisfaction, improvement in quality of life, long-term stability of therapeutic outcomes, prevention of adverse effects, and the use of objective indicators for quantitative evaluation of treatment success. To determine the effectiveness of physiotherapeutic interventions, it is possible to measure changes in pain intensity before and after treatment, the range of mandibular motion, the amplitude of joint opening and closing movements, chewing and speech function, as well as the severity of inflammatory processes. Furthermore, a comprehensive evaluation of physiotherapy outcomes in patients with temporomandibular joint pain dysfunction after jaw fractures may also include patient-reported satisfaction and quality-of-life measures, long-term follow-up of treatment results, monitoring of adverse events or complications, and the application of objective assessment tools such as joint measurements and electromyography. A comparison of physiotherapeutic modalities with other therapeutic approaches used in the management of painful temporomandibular joint dysfunction after jaw fractures makes it possible to identify their respective strengths and limitations.

1. Comparison with pharmacotherapy

From the perspective of physiotherapy, the main advantages include the absence of systemic drug-related adverse effects, targeted influence on affected tissues, promotion of muscle relaxation, and improvement of joint mobility. However, its disadvantages include the need for prolonged treatment courses and, in some cases, insufficient effectiveness, particularly in patients with severe pain syndrome. Pharmacotherapy, in contrast, provides rapid pain relief and may exert a systemic anti-inflammatory effect. At the same time, this method is associated with possible adverse reactions, the need for repeated or continuous administration, and the predominantly temporary nature of symptomatic improvement.

2. Comparison with surgical treatment

In relation to surgical intervention, physiotherapy has the advantage of being a conservative and non-pharmacological method, which in some cases allows surgery to be avoided or supports postoperative rehabilitation. Its limitation lies in the fact that treatment may require a longer period, especially in patients with complex or severe fractures. Surgical treatment, on the other hand, is often effective in complicated clinical situations, allows relatively rapid correction of structural abnormalities, and may contribute to faster stabilization of the pathological condition. Nevertheless, it is associated with operative risks, the need for a postoperative rehabilitation period, and the possibility of complications.

3. Comparison with psychotherapy and meditation

Physiotherapy also has certain advantages when compared with psychotherapy and meditation, since it may include relaxation-based procedures that reduce stress and muscular tension while simultaneously acting on functional disturbances. However, physiotherapeutic methods may be less effective in cases where psychosocial factors predominate or where severe physiological pathology persists. Psychotherapy and meditation are beneficial in stress reduction, pain coping, and emotional stabilization, and therefore may serve as useful adjuncts to physical rehabilitation. Their limitations include the fact that they do not directly eliminate structural or functional joint disorders and may require a considerable period before a therapeutic effect becomes evident.

4. Comparison with an integrated medical approach

As part of a comprehensive medical strategy, physiotherapy has the advantage of being specifically oriented toward restoration of joint function and improvement of local functional outcomes. Its disadvantage is that clinically meaningful results may require long-term

treatment. An integrated medical approach, by contrast, combines several therapeutic methods in order to achieve maximal effectiveness. However, its successful implementation requires close coordination among specialists, as well as substantial organizational and clinical effort. Overall, this comparison demonstrates that the choice of therapeutic strategy should be based on the individual characteristics of the patient, the severity of the pathological condition, and the patient's preferences. In most cases, the highest therapeutic effectiveness is achieved through a comprehensive and multidisciplinary approach. In the treatment of painful temporomandibular joint dysfunction in patients with jaw fractures, physiotherapy is considered an effective therapeutic method; however, its use may be associated with a number of complications and contraindications. Potential complications of physiotherapeutic interventions include aggravation of pain symptoms, skin irritation or allergic reactions, muscular fatigue, and, in some cases, the possibility of exacerbation of degenerative joint manifestations. Another important issue is the potential for insufficient or unsatisfactory treatment progress. With regard to contraindications, the application of physiotherapy in this category of patients requires careful consideration of acute inflammatory conditions, infectious or purulent processes, skin lesions, malignant neoplasms, pregnancy, cardiovascular diseases, and epilepsy. The presence of these factors necessitates a careful individualized assessment of each patient before initiation of physiotherapeutic treatment.

Conclusions. An essential consideration in the development of a physiotherapeutic treatment plan is the need to account not only for existing complications, but also for potential contraindications, in order to ensure both the safety and the clinical effectiveness of therapy. For this reason, the integration of physiotherapy into the comprehensive management of temporomandibular joint pain dysfunction requires a thorough understanding of the relevant medical factors as well as the individual characteristics of each patient. In conclusion, physiotherapy, as a significant component of comprehensive treatment, offers substantial opportunities for improving temporomandibular joint function in patients with jaw fractures. Nevertheless, careful evaluation of possible complications and contraindications remains indispensable for ensuring the safety and therapeutic success of the rehabilitation process. Future investigations in this field may further broaden the understanding of the role of physiotherapy and contribute to the optimization of its application in individual clinical cases.

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