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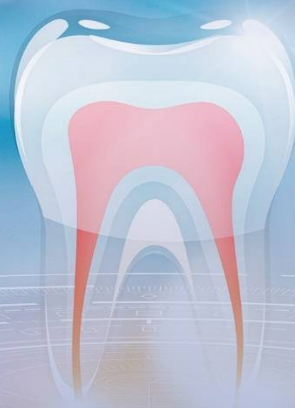
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СОДЕРЖАНИЕ | CONTENT

1. Tulyaganov Jamshid Shovkatovich, Rizaeva Sevara Mirgulyamovna, Abduvakilov Jahongir Ubaydullaevich A MODERN VIEW ON AN INTEGRATED APPROACH TO THE REHABILITATION OF PATIENTS WITH POSTOPERATIVE JAW DEFECTS.....	6
2. Ахмедов Алибек Баходирович, Эронов Ёқуб Қувватович ИПАК ИШЛАБ ЧИҚАРИШ КОРХОНАЛАРИ ИШЧИЛАРИДА СТОМАТОЛОГИК КЎРСАТКИЧЛАР ТАҲЛИЛИ.....	10
3. Ibragimova Feruza Ikramovna PREDICTION OF DENTAL MORBIDITY IN CHEMICAL INDUSTRY WORKERS.....	14
4. Насретдинова Махзуна Тахсиновна, Абдиев Элбек Муроджосимович ҚУЛОҚ ШОВҚИНИ БОР БЕМОРЛАРНИНГ КОНСЕРВАТИВ ДАВОСИНИ МАҚБУЛЛАШТИРИШ.....	17
5. Насретдинова Махзуна Тахсиновна, Бахронов Бекзод Шавкатович ҲОЛАТИЙ ХУРУЖСИМОН НИСТАГМ ГЕНЕЗИДА ИНФЕКЦИОН ВА ТОМИРЛИ ОМИЛЛАРНИ ТАДҚИҚ ЭТИШ.....	20
6. Nurova Shoxsanam Norpo'latovna OVERVIEW OF THE ETIOLOGY, DIAGNOSIS, TREATMENT AND PREVENTION OF DENTAL DEFORMITIES IN WOMEN IN EARLY MENOPAUSE.....	23
7. Рустамова Дилдора Абдумаликовна ОРГАНИЗАЦИЯ МЕДИКО-СТОМАТОЛОГИЧЕСКОЙ ПОМОЩИ ПАЦИЕНТАМ С СИСТЕМНЫМИ ВАСКУЛИТАМИ, ПЕРЕНЕСШИМИ КОРОНАВИРУСНУЮ ИНФЕКЦИЮ.....	27
8. Нарова Наргиза Элбековна, Мухамедов Иламан Мухамедович, Хасанова Лола Эмильевна ИЗУЧЕНИЕ ЧУВСТВИТЕЛЬНОСТИ МИКРОФЛОРЫ ПОЛОСТИ РТА У ПАЦИЕНТОВ, ПОДВЕРГАЮЩИХСЯ СЪЕМНОМУ И НЕСЪЕМНОМУ ОРТОДОНТИЧЕСКОМУ ЛЕЧЕНИЮ, ПРИ ИСПОЛЬЗОВАНИИ НЕКОТОРЫХ ЛЕКАРСТВЕННЫХ ПРЕПАРАТОВ.....	34
9. Нуоров Норпулот Бобокулович ОРТОПЕДИЧЕСКОГО ЛЕЧЕНИЯ ПОЖИЛЫХ ЛЮДЕЙ ПО ВОЗРАСТНЫМ СПЕЦИАЛЬНОСТЯМ.....	38
10. Зайтханов Аскар Анварович, Бекжанова Ольга Есеновна, Ризаев Элёр Алимджанович КЛИНИЧЕСКИЕ ПРОЯВЛЕНИЯ ВОСПАЛИТЕЛЬНЫХ ОСЛОЖНЕНИЙ ДЕНТАЛЬНОЙ ИМПЛАНТАЦИИ.....	41
11. Юнусходжаева Мадина Камалитдиновна, Хасанова Лола Эмиловна ОСОБЕННОСТИ ЭФФЕКТИВНОСТИ КАЛЬЦИЙСОДЕРЖАЩИХ ПРЕПАРАТОВ ПРИ ЛЕЧЕНИИ БЫСТРОПРОГРЕССИРУЮЩЕГО ПАРОДОНТИТА.....	44
12. Зайтханов Аскар Анварович, Бекжанова Ольга Есеновна ИНДИВИДУАЛЬНОЕ ПРОГНОЗИРОВАНИЕ РАЗВИТИЯ ОСЛОЖНЕНИЙ ДЕНТАЛЬНОЙ ИМПЛАНТАЦИИ НА ОСНОВАНИИ ОЦЕНКИ КЛИНИЧЕСКИХ ФАКТОРОВ РИСКА.....	47
13. Raximov Zokir Kayimovich, Pulatova Shahzoda Karimovna RESULTS OF TREATMENT OF UNCOMPLICATED LOWER JAW FRACTURES.....	52
14. Бекжанова Ольга Есеновна, Эгамбердиев Улугбек Абдумаликович АНАЛИЗ РАБОТЫ ВРАЧА - СТОМАТОЛОГА, НА ТЕРАПЕВТИЧЕСКОМ ПРИЁМЕ ПРИ ДИАГНОСТИКЕ И ЛЕЧЕНИИ КАРИЕСА ЗУБОВ.....	57
15. Бакаев Жасурбек Нажмидинович ҚОЗИҚ ТИШЛАР РЕТЕНЦИЯСИНИНГ ЭТИОПАТОГЕНЕЗИ ВА ДИАГНОСТИКАСИДА РАҚАМЛИ ЁНДАШУВ (Адабиётлар шарҳи).....	60
16. Zeynitdinova Ziyoda Askarovna COVID-19 BO'LGAN BEMORLARDA TIZIMLI YALLIGLANISH VA IMMUNO-GEMATOLOGIK BUZUQLIKLARNING MARKERLARI.....	67
17. Камбарова Шахноза Али Хусейнована, Рахимов Зокир Кайимович АНТРОПОМЕТРИЧЕСКИЕ ПАРАМЕТРЫ УГЛА НИЖНЕЙ ЧЕЛЮСТИ У ДЕТЕЙ С ВРГН.....	71
18. Turayeva Firuza Abdurashidovna THERAPEUTIC AND PREVENTIVE MEASURES IN PATIENTS WITH CHRONIC GENERALIZED PERIODONTITIS IN MENOPAUSAL WOMEN.....	74

RESULTS OF TREATMENT OF UNCOMPLICATED LOWER JAW FRACTURES

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ANNOTATION

The article presents the results of complex treatment of 105 patients with uncomplicated mandibular fractures. The proposed method is based on the local application of the physiotherapeutic method - infrared laser radiation to the area of the damage zone of the lower jaw. The obtained positive results of microbiological and immunological studies carried out in the dynamics of special and traditional methods of treatment allow us to recommend the widespread use of infrared irradiation in the complex pathogenetic therapy of traumatic injuries of the lower jaw in order to prevent infectious and inflammatory complications.

Key words: mandibular fracture, infrared laser radiation, physiotherapy, dysbiosis, immunodeficiency, oral cavity.

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РЕЗУЛЬТАТЫ ЛЕЧЕНИЯ НЕОСЛОЖНЕННЫХ ПЕРЕЛОМОВ НИЖНЕЙ ЧЕЛЮСТИ

АННОТАЦИЯ

В статье приведены результаты комплексного лечения 105 пациентов с неосложненными переломами нижней челюсти. Предложенный метод основан на локальном применении физиотерапевтического способа - инфракрасного лазерного излучения на область зоны повреждения нижней челюсти. Полученные положительные результаты микробиологических и иммунологических исследований, проведенных в динамике специального и традиционного методов лечения, позволяют рекомендовать широкое использование инфракрасного облучения в комплексной патогенетической терапии травматических повреждений нижней челюсти с целью профилактики инфекционно – воспалительных осложнений.

Ключевые слова: перелом нижней челюсти, инфракрасное лазерное излучение, физиотерапия, дисбиоз, иммунодефицит, ротовая полость.

According to the World Health Organization, injuries are the causes of death on average about 5.1 million people annually (accounting for 9.2% of the total number of deaths) [31] and are the cause of permanent disability and disability of more than 7 million people [12]. Recently, there has been a tendency to increase the proportion of injuries to the maxillofacial region (from 3 to 8%) [6, 19]. At the same time, functional disorders that occur as a result of injuries to the area of this localization are important, justified by the fact that vital organs are located in the maxillofacial region (CHLO) and the digestive and respiratory systems begin from it [1]. Fractures of the lower jaw (LF), according to some data, account for 67-92% (in Russia and CIS countries), according to others — 12.2—70.2% (in foreign countries) of cases. This pathology is more common in men (59.4—90.5%) of working age (16-59 years) [19, 27], which allows us to judge the economic, social and medical significance of solving the problem of complex treatment of fractures of the LF [2].

To date, the ever-increasing arsenal of drugs for drug treatment and physiotherapy methods aimed at treating the consequences of open fractures of the lower jaw does not always lead to the expected results. The consequences of traumatic injuries of the lower jaw include the development of complications, mainly of inflammatory genesis, and the frequency of their occurrence, according to various authors, ranges from

35 to 58%. Despite the use of the latest medical achievements in the development of effective treatment methods and various methods of fixing bone fragments in jaw fractures, the frequency of early (abscesses, osteophlegmon) and late (osteomyelitis, gingivitis, etc.) complications of an inflammatory nature remains high.

The search for new effective methods of treatment that prevent the development of post-traumatic complications is one of the urgent problems in dentistry. There is a growing interest in non-medicinal methods of treatment in maxillofacial surgery. An example of this is physiotherapy treatment, which is widely used to reduce pain, accelerate the resorption of edema and infiltration of tissues, improve blood supply in the fracture area [20].

Orthopedic methods of treatment involve fixing and immobilization of fragments of the lower jaw with intraoral splints. In this regard, it should be noted that both at the time of fixation of the tires, and throughout the entire time they are in the oral cavity, there is an inevitable injury to the marginal part of the periodontal tissue complex. A significant deterioration in the hygienic condition of the oral cavity in combination with the traumatic effect of fixing structures leads to the development of pathology in the marginal periodontal area or aggravates the existing one [3, 7, 4]. Generally accepted therapeutic and preventive methods of influencing the inflammatory process in

periodontitis, especially in difficult conditions of inter-jaw fixation, still cannot solve the problem, therefore, the development of the most effective means and methods appropriate for this purpose remains relevant and requires further study. Literature data indicate a broad preventive and therapeutic effect of low-intensity laser radiation used in various pathologies in the CHLO, including periodontal disease [8, 10].

Infrared light improves the function of the cardiovascular system, normalizes blood pressure, stimulates breathing, increases muscle strength and the speed of nerve conduction and reaction. Scientists and practitioners have long been using this radiation for medicinal purposes. A lot of infrared radiation devices have been developed, which are increasingly gaining confidence not only among doctors, but also among patients. With any suppurative disease, there are always local and general trophic disorders. To eliminate them, infrared irradiation is the most appropriate method along with other physiotherapy procedures. Redox processes are activated, the function of the endocrine glands is stimulated (especially with trans-cutaneous irradiation of blood and lymphatic vessels), new capillaries are formed faster in damaged tissues and collateral circulation develops more actively. In purulent diseases, carbuncles, the leading pathogenetic factor in the development of necrosis is thrombosis of small vessels. In such cases, the thrombolytic effect of low-power IR irradiation is of great importance. IR irradiation has an analgesic and sedative effect, and when exposed directly to the wound, it has a bactericidal and bacteriostatic effect.

Many studies have shown that IR irradiation improves regional blood flow in the area of the pathological focus, enhances the chemotaxis of leukocytes in the area of inflammation, activates proteolytic enzymes. In addition, regardless of the zone of exposure, it stimulates the mechanisms of natural resistance of the body (phagocytosis, lysozyme activity, etc.), as well as desensitizing mechanisms. All therapeutic and stimulating effects develop gradually and require from 3 to 15 procedures for their accumulation and implementation. A faster effect was noted with herpes simplex and toothache.

In the course of the research, a weak, short-term hypotensive effect was noted in hypertensive patients and the absence of a reaction or a slight increase in hypotension. Almost all patients had a sedative effect regardless of the irradiation zone. IR irradiation is combined with all medications and other physiotherapy procedures (with an interval of 1.5-2 hours), except for X-ray irradiation. Antibiotics and other chemotherapy drugs should be used only as prescribed by a doctor. IR irradiation can be used as an analogue of electrophoresis to accelerate the penetration of the drug under the skin. It is advisable to use it both before and during urgent operations, irradiating the surgical field, and then the wound, also when preparing patients for planned operations for chronic suppurative diseases (fistulas, etc.) [5].

Thus, the problems of developing and improving methods of treatment and prevention of complications in patients with mandibular fractures (mandibular fractures) continue to be relevant to this day, the current situation in the study of this problem at the present stage contributed to determining the purpose of our study.

The purpose of the study. To study the effectiveness of the use of infrared radiation in the complex treatment of patients with mandibular fractures for the prevention of complications of inflammatory genesis.

Material and methods of research. To achieve this goal, we examined 120 patients with diagnosed uncomplicated fractures of the lower jaw, without concomitant diseases. Their age range ranged from 18 to 60 years, of which there were 78 men and 27 women. All patients were divided into 3 groups: the first – the control group, with the number of 15 healthy people; the second – the comparison group, which included 50 patients with PNH treated by the traditional method and the third, the main group, which included 55 patients, with the inclusion of IR radiation in the treatment complex. Drug therapy with the traditional method consisted of intramuscular administration of cephalosporin antibiotics, mouthwashes with antiseptic solutions of furacilin in a dilution of 1:5000, 0.06% chlorhexidine and bifidumbacterin. In patients of both examined groups with PNH, immobilization of bone fragments was carried out orthopaedically by applying double-jawed Tigerstedt wire splints with an interjawed rubber traction.

Microbiological and immunological studies were conducted in all the victims with PNH in the dynamics of traditional and special treatment on the 1st, 7th, 14th and 30th days of therapy.

To carry out microbiological studies in this contingent of patients, oral fluid was taken by flushing from the oral mucosa (by rinsing). For the subsequent seeding of a certain volume of flushes on the surface of differential diagnostic nutrient media, we used highly selective nutrient media produced by the Indian company "Xi Media". The crops on blood agar, Endo agar, milk-salt agar and Saburo medium were cultivated under normal conditions for 18-24 hours at t 37 °C, and the cultivation of crops for the isolation of anaerobes was carried out in an anaerostat by using gas generator bags. After the specified time, all the seeded cups were removed from the thermostat and the grown colonies of microbes were counted, the group and species belonging of the isolated colonies were determined.

When working according to the modified method, the result was taken into account according to the last dilution in which bacterial growth was obtained, their number was calculated according to the formula: $K = A \times 200 \times P$ CFU/ml, the number of microbes was expressed in Lg CFU/ml. The etiologically significant pathogens were those sown at a concentration of more than 104-105 CFU/ml. Further identification and differentiation were determined by Bergy's [2001]. The basis of this bacteriological diagnosis was the isolation and identification of the pathogen.

Immunological studies. Simultaneously with microbiological studies, the state of local oral protection factors, such as phagocytic activity of leukocytes, lysozyme level and titer of class A secretory fraction immunoglobulin (s IgA), were studied in the same patients with PNH.

Determination of the phagocytic activity of neutrophils in the oral fluid was carried out according to the modified Antonov A.V. (1996) technique. To do this, the selected oral fluid was cleaned, washed with buffered solution and centrifuged at 1000 rpm. The infusion fluid was drained, and 0.5 ml of saline solution was added to the sediment. 0.1 ml of a suspension of latex particles (5×10^8 in 1 ml) with a diameter of 0.8 microns was added to 0.2 ml of the resulting suspension in a test tube. The mixture was incubated in a wet chamber for 30 minutes at 37 °C. Subsequently, smears were prepared from this mixture according to the type of blood smears, stained according to Romanovsky - Gimza. At least 100 neutrophils with and without latex in each preparation were counted in smears, the phagocytosis index was determined and expressed as a percentage.

The activity of lysozyme in the oral fluid was determined using the method proposed by Aliyev S.R. (2004), which included the use of sterile discs made of filter paper. For these purposes, paper discs (similar to antibiotic discs) were taken with tweezers and thoroughly soaked with oral fluid. After that, these discs were placed on the surface of Muller Hinton nutrient agar in Petri dishes sown with a lawn with a daily culture of *M. Luteus* stamp No. 003596/126 national collection of microorganisms of human infection of the EMIZ Research Institute of the Ministry of Health of the Republic of Uzbekistan. The crops were incubated in a thermostat at a temperature of 37 °C, the activity of lysozyme in the oral fluid was determined by the method of diffusion in agar.

The titer of the secretory fraction class A immunoglobulin (s Ig A) was determined by the Mancini method, which is based on measuring the diameter of the precipitation ring formed when oral fluid is introduced into the well, cut out in the agar layer in which monospecific serums are pre-dispersed. Under standard experimental conditions, the diameter of the precipitation ring is directly proportional to the concentration of immunoglobulin. Part of the research in this direction was carried out by the enzyme immunoassay.

Results and their discussion. The analysis of the obtained results of microbiological studies in the dynamics of traditional and special treatment allowed us to obtain the data displayed in the tables below.

Analysis of the state of the oral microflora in patients on the 7th day after treatment shows that the dysbiotic shifts that took place in the oral cavity on the first day not only did not improve, but on the contrary deepened even more. Although it should be noted that some positive changes have been noted in the quantitative parameters of streptococci.

At the same time, it should be noted that pathogenic strains of staphylococci (*St. aureus*) began to be sown in the oral cavity.

However, microbiological studies on the 14th day of traditional treatment show that positive changes have appeared in all indicators of the oral microflora, especially they relate to anaerobic microflora and cocci. It should be noted that with respect to gram-negative microflora, on the contrary, there is a negative picture, that is, the seeding rate has increased.

At the same time, the analysis of microbiological studies of the oral cavity on day 30, convinces us that the positive changes noted on day 14 are fully preserved, and according to some indicators, this is especially true of lactobacilli. But it should be noted that we have a negative picture on the seeding of fungi of the genus *Candida*.

The next group of our studies consisted of patients with PNH who, along with traditional therapy, received special treatment. The materials of these studies are presented in Table No. 2, from which it can be seen that already on the 7th day in the oral cavity of patients there are positive changes in all the studied microorganisms. However, it should be noted that pathogenic strains (*St. aureus*) of staphylococci began to be sown in this group of patients on day 7. The analysis of microbiological studies in the same patients on day 14 indicates that the positive changes that were noted on day 7 not only remained, but improved even more.

On the 21st day of special treatment in these patients, the picture of dysbiosis was virtually eliminated in all indicators. It is gratifying to note that these positive changes in patients with HPV in the oral cavity were also noted in relation to pathogenic strains of staphylococci and fungi of the genus *Candida*.

It was revealed that in the same patients on the 30th day of special treatment, positive changes in the microflora of the oral cavity that took place on the 21st day not only persisted, but deepened even more.

In all examined patients with PNH, along with microbiological studies, we also conducted a study of the state of local factors of oral cavity protection. The materials of these studies are presented in Tables No. 3, 4, which are also studied in the dynamics of traditional and special treatment.

As can be seen from Table No. 3 with traditional treatment, there is an immunodeficiency in all the studied parameters. At the same time, it is reliably expressed on the 1st and 7th days after treatment. Starting from the 14th day of traditional treatment, and especially on the 30th day, there is a significant improvement in the picture. However, it is not necessary to talk about the complete restoration of local immunity indicators.

Table No. 4 shows the indicators of local factors of oral cavity protection in patients with PNH in the dynamics of special treatment. The table shows that the immunodeficiency is most reliably expressed in terms of 1 and 7 days. However, starting from 14 days, there is a significant improvement in the picture of local immunity in all indicators. At the same time, in the same patients on the 30th day of special treatment, virtually all indicators of local oral protection factors are close to the control figures.

It is interesting to note that dynamic changes in the state of indicators of local oral protection factors in patients with PNH have a direct correlation with changes in dysbiosis in the oral cavity both with traditional and with special treatment.

According to our research (Table No. 5,6), it was found that the density of the microbial population in the oral cavity in healthy people

is a fundamental characteristic of the community and largely depends on the topography of the ecological niche. At the same time, the highest value was noted on the gum (4.20 ± 0.3 CFU cm²), the minimum on the mucous membranes of the palate (1.25 ± 0.1 CFU cm²).

At the same time, gram-positive flora was predominant in terms of abundance and species composition in the biocenosis, which colonized 100% of the subjects. It was found that the main part of the oral microflora in healthy individuals consisted of representatives of the genus streptococci, while the dominant species was *Str. salivarius*.

It should be noted that among the gram-positive microflora, staphylococci occupied a significant place in colonization, while their number prevailed on the surface of the tongue and gums. Among other studied microorganisms in matters of colonization of the oral cavity, gram negative rods (*Escherichia* and *Klebsiella*) had this property very weakly, and fungi of the genus *Candida* had the ability to colonize only on the mucous membrane of the tongue and gums (Mukhamedov I.M., Maksumova I., 2018).

It is quite obvious that studying the ability of microbes to colonize on various biotopes of the oral cavity allows us to understand the intimate processes occurring in the oral cavity, which, apparently, are undoubtedly related to the state of the oral fluid, as well as the presence of special receptors of our cells on which microorganisms can specifically adhere.

1. Significant decrease in colonization ability in streptococcal strains;

2. Against this background, the colonization ability of cultures of staphylococci and fungi of the genus *Candida* has sharply increased.

3. On all biotopes, the ability to colonize lactobacilli cultures decreases, and on individual biotopes, such as cheek and palate, they have been eliminated altogether;

4. Among the grams of negative flora, a stable colonization position can be noted in *Escherichia*.

Thus, based on the local protective factors obtained by studying the state of microflora and the ability of microbes to colonize in the oral cavity in patients with mandibular fractures, the following conclusions can be drawn:

1. Dysbiosis is noted in patients with fractures of the lower jaw in the oral cavity. At the same time, the use of traditional therapy does not allow to completely eliminate dysbiosis even for 30 days.

2. In patients with fractures of the mandible, with special treatment based on the local application of infrared radiation, it is already possible to almost completely restore dysbiosis to control figures on day 21.

3. The data obtained in both traditional and proposed treatment have a direct correlation with changes in dysbiosis, immunodeficiency and colonization resistance. These data once again testify to the unity of our body and homeostasis.

4. Based on the results of clinical and laboratory studies, it can be concluded that the best clinical indicators were obtained when applying the technique of exposure to infrared laser radiation with a wavelength of 0.89 microns. Quantitative and qualitative information regarding the identified microflora, as well as local protection factors in the dynamics of the proposed treatment method, allow us to recognize the use of infrared laser radiation as the method of choice in the complex treatment of mandibular fractures in order to prevent inflammatory complications. This is supported by the multifactorial pathogenetic effect and the absence of adverse side pharmacological effects of infrared radiation.

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ЖУРНАЛ СТОМАТОЛОГИИ И КРАНИОФАЦИАЛЬНЫХ ИССЛЕДОВАНИЙ

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