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THE EFFECT OF ULTRASONIC AEROSOL TREATMENT OF THE ORAL CAVITY ON THE RESULTS OF TREATMENT OF PATIENTS WITH FRACTURES OF THE LOWER JAW

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Annotation: This article presents the results of complex pathogenetic therapy of 231 patients with mandibular fractures treated in the department of the Bukhara Regional Multidisciplinary Medical Center for the period from 2008 to 2021. The main group of patients, along with the generally accepted treatment, was prescribed sessions of ultrasonic aerosol treatment of the oral cavity as local therapy. This method of physiotherapy treatment was carried out using a generator of low-frequency ultrasonic vibrations "STOMATON - MM". The high efficiency of the proposed complex of pathogenetic therapy in the treatment of patients with uncomplicated fractures of the mandible has been established.

Key words: traumatic injuries of the lower jaw, infected bo ne wound, inflammatory complications, ultra sound.

The relevance of research. The analytical information of a number of researchers demonstrates the fact that 40% of the number of all patients being treated in the departments of maxillofacial surgery are patients with injuries of the maxillofacial region. In the structure of damage to the facial skeleton, fractures of the lower jaw are most common, which, according to domestic and foreign clinics, range from 70% to 85%. At the same time, the frequency of inflammatory complications continues to be high (from 9% to 40%), which significantly complicates the treatment of patients with this pathology.

The most frequent and formidable complication of mandibular fractures is traumatic osteomyelitis. According to various authors, its frequency reaches 30%. Attention is drawn to the fact that the victims with fractures of the lower jaw are practically healthy people. Therefore, the main task in their treatment is to create optimal conditions for the manifestation of the biological law of reparation.

In the complex treatment and prevention of purulent-inflammatory complications of mandibular fractures, along with general antibacterial therapy and homeostasis correction, an important component is the local effect on an infected bone wound. For this purpose, a large number of methods and tools have been proposed. However, it was not possible to achieve a significant reduction in the number of complications in the post-traumatic period.

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.

Thus, based on the literature data, it can be stated that the issues of medical rehabilitation of victims with fractures of the lower jaw still remain unresolved.

The aim of the study is to study the effectiveness of the ultrasonic aerosol treatment of the oral cavity in the treatment of patients with fractures of the lower jaw.

Materials and methods. Depending on the treatment , all patients were divided into the following groups:

Group I – 122 patients with fractures of the mandible, whose treatment was carried out by orthopedic method and the appointment of traditional drug therapy with a solution of furacillin in a dilution of 1:5000 and a solution of liquid bifidumbactrin.

Group II – 109 people, patients with fractures of the lower jaw, treated with orthopedic method and the appointment of drugs Serrate, sextophage, in addition to traditional drug therapy (including also Azithromycin), furacillin solution in dilution 1:5000, chlorhexidine and liquid bifidumbactrin solution. They underwent physical methods of treatment by prescribing courses of low-frequency ultrasound to the area of damage to the lower jaw.

In the treatment of patients with fractures of the lower jaw, traditional orthopedic immobilization and drug therapy were performed. Orthopedic treatment consisted of repositioning and inter-jaw immobilization of fragments using various modifications of individually bent wire or standard tape splints with snap loops.

Ultrasonic aerosol treatment of the oral cavity in patients with fractures of the lower jaw was carried out using a generator of low-frequency ultrasonic vibrations "STOMATON - MM" with a specially designed acoustic node and waveguides having an axial groove through which the voiced solution enters the end of the waveguide.

Operating modes of the device: the operating frequency is 26.5 kHz, the amplitude of the displacement of the working end of the waveguide is 40-50 microns, the ultrasound intensity is about 10 W / cm2, the flow rate of the voiced solution is up to 20-40 ml/min.

On the surface of the liquid layer spilled on the normally oscillating surface of the radiator, an aerosol is formed with the diameter of aerosol particles.

Under the action of reciprocating movements of the waveguide, echelons of aerosol particles fly off its end with a starting speed of about 5 m / sec, are directed to the mucous membrane of the oral cavity and hitting the liquid layer on it excite acoustic waves that enter the tissue, while an aerosol torch is formed.

The control group did not receive an ultrasound method of treatment and those medications that were used in special treatment. In the main group of patients, the probiotic Florbiolact, the antibiotic Azithromycin, the enzymatic drug Serrata and the phage Sextophagus were used. The method of oral cavity treatment was as follows: a solution of the probiotic Florbiolact was injected into the wound using a turunda impregnated with it and a connected device "STOMATON - MM".

The manipulation was performed on a dental chair. A waveguide with a diameter of 3-5 mm was used, the distance from the end of the waveguide to the wound surface was up to 3-4 cm.

During the voicing, the torch was gradually moved along the entire length of the damaged bone tissue so that the impact on the surface was carried out for at least 10-15 seconds on an area of 1.5 cm2. The angle of inclination of the waveguide relative to the surface of the fracture zone does not matter, since aerosol particles hitting the surface of the liquid at any angle will excite acoustic flows propagating parallel to the

voiced surface.

The ultrasonic sounding time was up to 3-5 minutes. The consumption of the solution per treatment averaged from 20 to 40 ml.

Results and their discussion.

Total bacterial and colonization contamination of the oral cavity by microorganisms in patients of the I group of subjects.

Bacteriological examination of the oral cavity in 122 patients with fractures of the mandible identified 47 strains of gram-positive and gram-negative aerobic and facultative anaerobic bacteria.

The species composition of the oral microflora in patients of group I is presented in Table 1.

Table 1 Species composition of oral microflora in patients in group I (n=122)

Type of microorganism	Upon admission	Upon admission After treatment	Upon admission After treatment	Upon admission After treatment
Strip. mutans	$1,5 \times 10^6$	$1,4 \times 10^6$	$l,4x\ 10^6$	$1,4 \times 10^5$
Str. salivarius	10^8	10^8	10^7	10^7
Strep. mitis	10^8	10^8	10^8	10^7
Lactobacillus	10^5	10^5	10^4	10^5
Staph. aureus	10^4	10^4	10^3	10^2
Candida	10^3	10^3	$I0^2$	$I0^2$
Fusobacteria	10^4	10^4	10^5	10^5
K. pneumoniae	10^2	10^3	10^2	10^2
E. coli	10^3	10^2	10^3	10^2

From the data in Table 1, it can be seen that during the bacteriological study of the qualitative composition of the oral microflora, non-spore-forming obligate anaerobes prevailed - 67.8% of the association participants (the vast majority were anaerobic cocci of the genus Peptostreptococcus - 22%). Of facultative anaerobic bacteria, cocci - Staphylococcus dominated (20.8%), and when exposed to the oral cavity by ultrasound, their number by day 3 slightly decreased by 2 orders of magnitude. At the same time, the number of facultative anaerobes and aerobes decreased by 1 order of magnitude, that is, ultrasound is not active in relation to the entire spectrum of microflora found in the oral cavity, but to the greatest extent - in relation to obligate anaerobes. Bacterial associations are represented by 3-4 species, which corresponds to the literature data and confirms the etiological role of resistant oral microflora in the development of the inflammatory process, since it is known that normally obligate non-spore-forming microorganisms are in the oral cavity in predominant quantities. The species composition of microorganisms in the control group in the dynamics of the study did not reveal minor changes compared to the first day.

Total bacterial and colonization contamination of the oral cavity by microorganisms in patients of group II of the examined.

The species composition of the oral microflora of patients of group II is presented in Table 2.

Table 2 Species composition of the oral microflora of patients of group II (n=109)

Type of microorganism	Before processing	After treatment 1 day	After treatment 3 days	After treatment, day 7
S. mutans	$1,5 \times 10^6$	$1,5 \times 10^4$	$1,4 \times 10^4$	$1,5 \times 10^3$
S. salivarius	10^8	10^8	10^6	10^4
S. mitis	10^7	10^7	10^5	10^4
Lactobacilli	10^4	10^4	10^3	10^3
S. aureus	10^4	10^4	10^3	10^3
Candida	10^3	10^3	10^3	10^2
Fusobacteria	10^4	10^4	10^3	10^3
K.pneumonie	10^2	10^2	10^2	10.
E. coli	10^2	10^2	10	не обн.

According to Table 2, it can be seen that in patients of group II in the oral cavity, the number of microorganisms such as S. mutans decreased from 1.5 x 106 to 1.5 x 103, S. salivarius from 108to 104, S. mitis from 107 to 104. The quantitative composition of other types of microflora did not change significantly. Changes in the quantitative composition of microflora in this group are due to the antiseptic properties of the probiotic florbiolact solution, which are enhanced by ultrasound, and have a beneficial complex therapeutic effect on patients of group II with purulent-inflammatory complications in fractures of the lower jaw.

An important indicator of the effectiveness of the use of physical methods for topical application in purulent-inflammatory complications of fractures of the lower jaw is the total bacterial contamination of the oral cavity. When analyzing its indicators, a significant reduction in the time of cleansing the oral cavity from microflora was revealed with the combined physical effect of ultrasound treatment and a solution of the probiotic florbiolact, which correlates with clinical data.

The indicators of bacterial contamination in the studied groups are presented in Table 3.

Table 3 Indicators of bacterial contamination in the study group (n=231)

Group	Research Day			
	1 - th day	3- th day	5- th day	7- th day
1 Group	$6,3 \times 10^4$	$5,8 \times 10^4$	$5,4 \times 10^3$	$4,6 \times 10^2$
2 Group	$4,7 \times 10^4$	$4,5 \times 10^4$	$3,7 \times 10^3$	$2,3 \times 10^2$

As can be seen from Table 3, already on the 3rd day of the study in patients of group I, this indicator was 3 orders of magnitude less than in patients of the main group. In group II patients with ultrasound treatment with a solution of the probiotic fluorobiolact, the indicators were 1-2 orders of magnitude lower than in the control group, and 1-2 orders of magnitude higher than in group I patients using a 1:5000 furacilin solution.

The total bacterial contamination of the oral cavity by days of ultrasound treatment is presented in Table 4.

According to the data given in Table 4, it can be seen that during the bacteriological study of the qualitative and quantitative composition of the oral microflora in the individuals of the studied groups, the predominance of non-spore-forming obligate anaerobes was found - 67.8% (the vast majority were anaerobic cocci of the genus Peptostreptococcus - 22%). Among facultative anaerobic bacteria, Streptococcus bacteria dominated (20.8%), and when exposed to the oral cavity by ultrasound, their

number decreased by 2 orders of magnitude by day 3, while the number of facultative anaerobes and aerobes decreased by 1 order.

Table 4 Total bacterial contamination of the oral cavity by days of ultrasound treatment (n=109)

Type of microorganism	Before processing	1 day	3 day	7 day
St. mutans	$1,5 \times 10^6$	$1,5 \times 10^3$	$1,5 \times 10^7$	$1,5 \times 10^6$
St. salivarius	10^8	10^8	10^7	10^8
St. mitis	10^7	10^7	10^5	10^6
Lactobacilli	10^5	10^4	10^3	10^4
S. aureus	10^4	10^4	10^4	10^3
Candida	10^3	10^4	10^3	10^2
Fusobacteria	10^5	10^4	10^3	10^4
K. pneumoniae	10^2	10^2	not detected.	$10.^2$
E. coli	10^2	10^2	not detected.	not detected.

The isolated strains of streptococci were identified as S. ruo-genees (7 strains) and S. faecalis (7 strains). This test was used in 43 patients in parallel with a bacteriological study. Group A streptococci the test gave positive results in 12 cases, of which 7 cultures of S. pyogenees were isolated during bacteriological examination, and in 5 cases pure cultures of streptococci were not isolated.

According to Table 5, there was no significant change in the number of strains and adhesive properties of the oral microflora in the group using ultrasound treatment, and a slight decrease in the number of strains was associated with the action of ultrasound and probiotic itself.

An important indicator of the effectiveness of the use of physical methods for topical application in fractures of the lower jaw is the total bacterial contamination of the oral cavity. When analyzing its indicators, a significant reduction in the time of cleansing the oral cavity from microflora was revealed with the combined physical effect of ultrasound treatment of the oral cavity with various solutions, which correlates with clinical data.

As can be seen from Table 5, already on the 3rd day of the study in patients of the 2nd group (ultrasound treatment with a solution of the probiotic florbiolact), this indicator was 3 orders of magnitude less than in patients of the control group. In patients of group I, the indicators were 1-2 orders of magnitude lower than in the control group, and 1-2 orders of magnitude higher than in patients of group II using a solution of the probiotic florbiolact.

The total bacterial contamination of the oral cavity by days of ultrasound treatment is presented in Table 6.

From the indicators given in Table 6, it can be seen that during the bacteriological study of the qualitative and quantitative composition of the oral microflora in the individuals of the studied groups, the predominance of non-spore-forming obligate anaerobes was found - 67.8% (the vast majority were anaerobic cocci of the genus Peptostreptococcus - 22%), among facultative anaerobic bacteria, Streptococcus bacteria dominated (20.8%). When exposed to the oral cavity by ultrasound, their number

decreased by 2 orders of magnitude by the 3rd day, while the number of facultative anaerobes and aerobes decreased by 1 order of magnitude. The isolated strains of streptococci were identified as S. ruodepes (7 strains) and S. faecalis (7 strains). This test was used in 43 patients in parallel with a bacteriological study. With respect to Strep A, the test gave positive results in 12 cases, of which 7 cultures of S. pyogenees were isolated during bacteriological examination, and in 5 cases pure cultures of streptococci were not isolated.

Thus, in the complex treatment of purulent-inflammatory complications of mandibular fractures, physical methods are of great importance, since they are the most effective, economical and inexpensive methods. In order to study the effectiveness of physical methods of treatment, the study studied the prevention of purulent-inflammatory complications in fractures of the lower jaw, the potential pathogenicity of microorganisms isolated from the oral cavity and the effect of low-frequency ultrasound on the oral microflora in patients with fractures of the lower jaw. During surgical treatment, the energy of low-frequency ultrasonic vibration is split into florbiolactal contact in pathologically damaged tissues, has a neuroreflective effect, improves blood circulation and lymph circulation, activates biochemical processes and modifies metabolism, while accelerating reparative processes in cells. The optimal result was observed in the wound tissue at the end of treatment with a good clinical effect in patients treated with a solution of the probiotic florbiolact.

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