

Complex Approach to Pathogenetic Therapy of Patients with Lower Jaw Fractures and Their Complications

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ABSTRACT

One of the global health problems in general and maxillofacial surgery in particular, special attention is paid to continuing the study of the etiology, prevention and complex pathogenetic therapy of purulent-inflammatory complications of mandibular fractures, both from the point of view of the theoretical justification of the main provisions of the modern paradigm of purulent-inflammatory diseases. complications of mandibular fractures, and in relation to the practical application of scientific achievements.

KEYWORDS: *mandibular fractures, microbial contamination, intestinal dysbacteriosis, colonization resistance of the body, oral dysbiosis, radiological methods.*

Many researchers have found that purulent-inflammatory complications in mandibular fractures (MLF) caused by microbial associations are more severe and more extensive than lesions caused by monocultures. In addition, the processes caused by microbial associations are characterized by secondary local and general complications with severe interstitial edema and extensive tissue necrosis against the background of a reduced number of cellular elements. The occurrence of complications in PLF also depends on the amount and virulence of the microflora [2.4.6.8.].

According to the literature, the frequency of their occurrence reaches 37.2-55.1%, and osteomyelitis is diagnosed in 16.8% of cases. When studying the anamnesis, it was found that 87.3% suffered as a result of domestic trauma, and the majority (68.7%) received it while intoxicated, as indicated mainly by the left-sided localization of the mandibular fracture. Most often, injuries were observed in men of the most able-bodied age (30-40 years)[1.3.5.7.9].

Materials and methods of the study: In order to optimize the pathogenetic therapy of HPV and their complications, 2 groups of patients were included in the study: one of the groups of patients was offered traditional, the other – special therapy. With traditional therapy, group I was prescribed: Furacilin, Chlorhexidine and Bifidumbacterin. In addition, Tigerstedt tires were applied orthopaedically in the oral cavity. The following drugs were used as special treatment in group II: Serrata, Sextophag, Azithromycin and Florbiolact, which gave us positive results.

Surgical interventions were performed with complications of phlegmon of different localizations, among them: 35 patients with submandibular phlegmon, 20 with phlegmon of the pterygomandibular space, 31 with phlegmon of the subasseterial region, 3 with diffuse phlegmon of the floor of the oral cavity, 3 with abscessing fistula and 15 with chronic posttraumatic osteomyelitis [11.12.13.14.15.17.19].

Purulent foci were opened and in the first days of the postoperative period, the wound was treated with a Sextophagus solution, in addition, a 10 ml Sextophagus was prescribed for oral administration.

It should be noted that before the use of a complex of therapeutic drugs in patients with PNH, we conducted microbiological studies to determine the sensitivity of microbes most often living in the oral cavity to the tested drugs in vitro (Table 1).

The table shows that the antiseptic furacilin had a reliable bactericidal effect on 5 types of microbes, among which the majority are cocci. At the same time, the drug Chlorhexidine had an effect on two types of microbes - Staphylococcus and Klebsiella.

At the same time, the eubiotic Bifidumbacterin turned out to be an antagonist in relation to all tested microbes, but the most pronounced relative to four types of microbes was indicated in Table No. 1 below.

Table No. 1. Characteristics of the sensitivity of microbes to drugs in vitro! (M ±m) mm. (n=122)

№	Groups	microbesFuracilin	Chlorhexidine	Bifidumbacterin
1	Str. salivarius	20,0 ± 0,3	15,0 ± 0,2	15,0 ± 0,1
2	Str. mutans	21,0 ± 0,3	16,0 ± 0,2	15,0 ± 0,2
3	Str. mitis	18,0 ± 0,2	18,0 ± 0,2	18,0 ± 0,2
4	Staph.aureus	19,0 ± 0,2	19,0 ± 0,3	13,0 ± 0,1
5	St.epidermidis	20,0 ± 0,3	13,0 ± 0,2	19,0 ± 0,3
6	St.saprofithicus	20,0 ± 0,2	16,0 ± 0,2	14,0 ± 0,2
7	Esch. coli JII	12,0 ± 0,1	16,0 ± 0,2	20,0 ± 0,4
8	Esch. coli JH	11,0 ± 0,1	15,0 ± 0,1	25,0 ± 0,4
9	Prot. vulgaris	15,0 ± 0,1	14,0 ± 0,1	15,0 ± 0,2
10	Klebsiella	21,0 ± 0,3	22,0 ± 0,3	21,0 ± 0,3
11	Pseudomonas	13,0 ± 0,1	14,0 ± 0,1	15,0 ± 0,2
12	Candida albicans	11,0 ± 0,1	13,0 ± 0,1	12,0 ± 0,1

Notes: Units are given in mm of the microbe growth retardation zone (mm).

The preparations Sextaphage and Cerrata had an antibacterial effect on most microbes (Table 2). At the same time, the antibiotic Azithromycin, the eubioticFlorbiolact had a significant antibacterial effect on most of the tested microbes of 6-7 species out of 12.

Initially, we will give a microbiological assessment of these drugs in terms of providing antibacterial activity on 12 types of microbes that make up the main flora of the oral cavity. The obtained materials of these studies are shown in Tables 1 and 2.

Table 2. The sensitivity of microbes to drugs with special treatment in vitro! (M ± m) mm. (n=109)

№	Groups microbes	Sextaphage	Cerrata	Azitromicin	Florbiolact
1	Str. salivarius	11,0 ± 0,1	0	16,0 ± 0,2	18,0 ± 0,2
2	Str. mutans	12,0 ± 0,1	0	15,0 ± 0,1	20,0 ± 0,3
3	Str. mitis	0	0	15,0 ± 0,2	19,0 ± 0,2
4	Staph.aureus	11,0 ± 0,1	13,0 ± 0,1	21,0 ± 0,3	21,0 ± 0,3
5	St.epidermidis	11,0 ± 0,1	11,0 ± 0,1	22,0 ± 0,3	20,0 ± 0,3
6	St.saprofithicus	16,0 ± 0,2	12,0 ± 0,1	14,0 ± 0,2	22,0 ± 0,3
7	Esch. coli JII	16,0 ± 0,2	12,0 ± 0,1	15,0 ± 0,2	25,0 ± 0,4
8	Esch. coli JH	13,0 ± 0,1	0	21,0 ± 0,3	26,0 ± 0,4
9	Prot. vulgaris	16,0 ± 0,2	11,0 ± 0,1	22,0 ± 0,3	15,0 ± 0,2
10	Klebsiella	16,0 ± 0,2	11,0 ± 0,1	16,0 ± 0,2	11,0 ± 0,1

11	Pseudomonas	13,0 ± 0,1	0	21,0 ± 0,3	12,0 ± 0,1
12	Candida albicans	15,0 ± 0,2	0	22,0 ± 0,3	0

Notes: Units are given in mm of the microbe growth retardation zone (mm).

Table No. 1 shows that the antibacterial effect of furacilin is significantly higher on gram-positive flora: streptococci, staphylococci. At the same time, it had a less pronounced effect on gram-negative flora, such as: Escherichia, proteus and fungi of the genus Candida. The antiseptic chlorhexidine also had an antibacterial effect on most of the microbes tested, although it should be noted that its effect, if compared with the action of furacilin, is much lower, both in relation to gram-positive and gram-negative flora. However, this antiseptic had the most reliable antibacterial effect on the group of the capsule microbe Klebsiella, which was 22.0 ± 0.3 mm.[16.18.20.21.22].

It is quite appropriate to note that dysbiotic disorders in the oral cavity pass along the chain to a violation of the entire gastrointestinal system. That is, this leads to a violation of both quantitative and qualitative ratios of microbes throughout the entire parameter of the intestine in which the process is taking place, reducing the amount of positive flora, such as bifidobacteria, lactobacilli. But against this background, there is an increase in the number of conditionally pathogenic flora, that is, the picture of intestinal dysbiosis develops. It was these processes that prompted us to use the eubiotic Bifidumbacterin to reduce the picture of intestinal dysbiosis, which is formed in monitoring the development of the disease[23.25.27.29].

As can be seen from Table No. 1, Bifidumbacterin had an antagonistic effect on the bulk of the microbes used. However, it had the most pronounced antagonistic effect on the gram-negative flora - Escherichia, in which it was equal to 25.0 ± 0.4 mm. It is known that phages have a high specificity of antibacterial action. This can explain such diverse actions of the sextaphage (Table No. 2). Although it should be noted that its effect is more reliable on gram-negative flora than on gram-positive. The drug Cerrata is an enzyme mainly prescribed to improve the digestive process of the gastrointestinal tract, that is, to break down food substrates used by patients.

The antibiotic Azithromycin, which has a wide spectrum of antibacterial action, had a significant effect on the tested microorganisms. From table No.2. it can be seen that it had a pronounced antibacterial effect on cultures of staphylococci, Escherichia, proteus, Pseudomonas and fungi of the genus Candida[24.26.28].

In patients with PNH, due to a violation of oral hygiene and a decrease in local protective factors in the mucous membrane, the formation and development of the syndrome of excessive growth of microorganisms, i.e. dysbiosis, occurs. The drug Florbiolact was developed by scientists to reduce the picture of dysbiosis in the oral cavity in patients.

The eubiotic Florbiolact had a significant antagonistic effect on the majority of both gram-positive and gram-negative microbes studied from the group. At the same time, it had a weak effect on Klebsiella and pseudomonas cultures, and had no effect at all on the cultures of Candida fungi.

Table No. 3. Indicators of local factors of oral cavity protection in patients with mandibular fractures in the dynamics of traditional treatment. (n=122)

№	Indicators	Standard	The patient has a fracture.	In the course of treatment			
				1 д	7 д	14 д	30 д
1	Lysozymetitermg%	18,5±0,3	11,6±0,2	12,1±0,1	11,5±0,1	12,2±0,1	15,1±0,1
2	Phagocytosisindex %	56,2±2,2	46,1±1,5	45,0±0,2	41,2±0,1	47,0±1,1	48,2±1,1
3	The secretory	2,2±0,1	1,4±0,1	1,3±0,1	1,2±0,1	1,5±0,1	1,6±0,1

	level. immunoglobulin. A s IgA g l						
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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. 4. From the table it can be seen that already on the 7th day in the oral cavity of patients, positive changes are noted in all the studied flora. Although it should be noted that pathogenic strains (*St aureus*) of staphylococci were 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 were not only preserved, but even more improved.

On the 21st day of special treatment, the picture of dysbiosis has actually been eliminated in all indicators. On the 30th day of special treatment, the positive changes in the oral flora that took place on the 21st day improved even more. These positive changes have occurred due to the use of general and local eubiotics.

As can be seen from Table No. 4, after traditional treatment, there is an immunodeficiency in all studied parameters. At the same time, the decrease in the immune status was significantly 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 immunodeficiency indicators [28.29].

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 day 14, there is a significant improvement in the picture of immunodeficiency 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 the dynamic change in the state of the indicators of local immunity of the oral cavity in patients with PNH have a direct correlation with changes in dysbiosis in the oral cavity, both after traditional and after special treatment.

Table No. 4. The state of local protective factors in patients with fractures of the lower jaw with special treatment in dynamics. (n=109)

№	Indicators	Standard	The patient has a fracture.	In the course of treatment			
				1 д	7 д	14 д	30 д
1	Lysozymetitermg %	18,5±0,2	11,5±0,3	14,0±0,2	12,5±0,2	16,1±0,1	17,0±0,2
2	Phagocytosisindex %	56,2±2,1	45,3±1,5	48,1±1,2	41,0±1,1	51,2±1,4	54,0±1,3
3	The secretory level. immunoglobulin. A s IgA g l	2,1±0,1	1,4±0,1	1,4±0,1	1,5±1,2	1,7±1,1	1,9±1,2

The most interesting data were obtained by us in the study of colonization resistance of microbes by oral cavity biotopes such as: gums, tongue surface, cheek and palate in patients with fractures of the lower jaw.

According to our research (Table 5), 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 in the gum

(4.20 ± 0.3 CFU /cm²), significant on the mucous membrane of the palate (1.25 ± 0.1 CFU/cm²).

At the same time, gram-positive flora was predominant in terms of number and species composition in biocinosis, which colonized in 100% of the subjects. It is interesting to note that the main part of the oral microflora in healthy individuals consisted of representatives of the genus streptococci, with *Streptococcus salivarius* being the dominant species.

It should be noted that among the gram-positive flora, staphylococci occupied a significant place, while their number prevailed on the surface of the tongue and gums [28,29]. Among other microorganisms studied in the 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 the mucous membranes of the tongue and gums (Mukhamedov I.M., Makhsumova I., 2018).

Table No. 5. The state of colonization resistance of oral microbes in patients with fractures of the lower jaw. (n=231)

№	Group of microbes	Oralcavity areas			
		Gum	Language	Cheek	Sky
1	<i>Lactobacillus</i>	2,0±0,1	1,30±0,1	0	0
2	<i>Streptococcus salivarius</i>	4,60±0,2	3,85±0,2	2,30±0,1	2,0±0,1
3	<i>Streptococcus mutans</i>	3,10±0,2	3,0±0,1	1,60±0,1	1,0±0,1
4	<i>Streptococcus mitis</i>	2,85±0,1	2,0±0,1	2,10±0,1	1,0±0,1
5	Staphylococci	4,85±0,3	4,15±0,2	3,0±0,2	2,30±0,1
6	<i>Escherichia</i>	2,0±0,1	1,80±0,1	1,6±0,1	1,15±0,1
7	<i>Klebsiella</i>	2,80±0,1	1,15±0,1	0	0
8	Fungi of the genus <i>Candida</i>	2,15±0,1	3,0±0,2	4,10±0,1	4,0±0,1

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

1. Dysbiosis noted in patients with PNH in the oral cavity. At the same time, the use of traditional therapy in such patients does not allow to completely eliminate dysbiosis even for 30 days.
2. At the same time, in patients with PNH, a special course of treatment, already for 21 days, makes it possible to almost completely restore dysbiosis to control figures.
3. It is interesting to note that the information obtained after both traditional and special treatment has a direct correlation with changes in dysbiosis, immunodeficiency and colonization resistance. These data once again testify to the unity of the homeostasis of our body.

Species composition of the oral microflora in patients of group I

The specific composition of the oral microflora in patients of group I is presented in Table 6. From the data of this table, it can be seen that with traditional treatment with oral irrigation with solutions of furacillin and chlorhexidine, a bacteriological study of the qualitative composition of the oral microflora showed a predominance of non-spore-forming obligate anaerobes - 67.8%. Of facultative anaerobic bacteria, cocci - *Staphylococcus* dominated (20.8%), moreover, 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. That is, the low efficiency of ultrasound was noted 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. In the dynamics of the study, significant changes in the species composition of microorganisms in the control group compared to the first day were not revealed.

Table No. 6. Species composition of oral microflora in patients in group I (n=122)

Type of micro organism	Upon admission	1 day	3 day	7 day
<i>S. mutans</i>	$1,5 \times 10^6$	$1,4 \times 10^3$	$1,4 \times 10^6$	$1,4 \times 10^5$
<i>S. salivarius</i>	10^8	10^8	10^7	10^7
<i>S. mitis</i>	10^8	10^8	10^8	10^7
<i>Lactobacillus</i>	10^5	10^5	10^4	10^5
<i>S. aureus</i>	10^4	10^4	10^4	10^3
<i>Candida</i>	10^3	10^3	10^2	10^2
<i>Fusobacteria</i>	10^4	10^4	10^5	10^5
<i>K. pneumoniae</i>	10^2	10^3	10^2	10^2
<i>E. coli</i>	10^3	10^2	10^3	10^2

Table 6 shows that there is a significant decrease in the amount of oral microflora in the group of patients who, along with special treatment, underwent ultrasonic aerosol treatment of the oral cavity with a solution of the probiotic Florbiolac injected into the wound using a turunda impregnated with it and a connected low-frequency device "STOMATON MM". A sharp decrease in the number was noted from the first days of physical treatment in representatives of the following species: *S. mutans*, *S. mitis*, *S. salivarius*. On the 7th day from the beginning of ultrasonic aerosol treatment of the oral cavity with a solution, there was a significant decrease in the number of representatives of such species as *Fusobacteria* and *K. pneumoniae*. On the 7th day from the beginning of voicing during bacteriological sowing from the oral cavity, representatives of *E. coli* were not sown. These results indicate a pronounced antiseptic effect of both ultrasound and hypochlorite solution, which has a detrimental effect on most representatives of the oral microflora.

The adhesion of microflora and the number of oral cavity strains in patients in group I are presented in Table No. 7. The data presented in Table No. 8 show that 80 strains of gram-positive and gram-negative anaerobic and facultative anaerobic bacteria were isolated during bacteriological examination of the oral microflora obtained in 122 patients with PNH. 42 strains (34.42%) were classified as gram-negative bacteria. They were represented by 58 strains of staphylococci, 14 strains of streptococci and 1 strain of *Bacillus cereus*. From the data in Table No. 8, it can be seen that in the group using ultrasound treatment, there was a significant decrease in the number of strains of the following bacterial species - *S. aureus*, *S. epidermidis*, *S. salivarius*, *N. mucosa*. Representatives of such species as *K. pneumoniae*, *Candida*, *E. coli*, *R. mirabilis* were not detected in the crops on the 7th day of treatment, which notes the pronounced antiseptic activity of the solution in combination with the action of ultrasound and a 1:5000 solution with furacilin.

Table No. 7. Number of strains and adhesiveness of oral microflora in patients in group I (n=122)

Genus and species of microorganisms	1 day		3 day		7 day	
	Number of strains	Adhesive strains (number/%)	Number Of strains	Adhesive strains (число/%)	Number of shtam-mov	Adhesive strains (number/%)
<i>S. aureus</i>	19	22/53,6	37	25/67,5	31	24/77,4
<i>S. epidermidis</i>	37	21/56,7	25	24/96	22	21/95,4
<i>S. pyogenes</i>	2	1/50	1	1/100	1	1/100
<i>S. faecalis</i>	6	3/50	4	3/75	2	2/100
<i>S. salivarius</i>	21	6/28,5	20	4/20	16	3/18,7

S. mutans	3	2/66,6	2	2/100	2	1/50
Род Neisseria	14	3/21,4	8	3/37,5	5	2/40
N. mucosa	12	2/16,6	6	2/33,3	4	1/25
N. sicca	2	1/50	2	1/50	1	1/100
Enterobacter	13	13/100	9	9/100	6	6/100/
K. pneumon.	3	3/100	2	2/100	2	2/100
Pseudomonas	5	5/100	4	4/100	2	2/100
Candida	3	3/100	2	2/100	1	1/100
E. coli	4	4/100	2	2/100	1	1/100
P. mirabilis	1	1	1	1	1	0

In Table No. 7, the data presented show that 80 strains of gram-positive, gram-negative anaerobic and facultative anaerobic bacteria were isolated during a bacteriological study of the oral microflora obtained in 109 patients with PNH. 42 strains (34.42%) were classified as gram-negative bacteria. They were represented by 58 strains of staphylococci, 14 strains of streptococci and 1 strain of *Bacillus cereus*. From the data in Table 27 it can be seen that in the group using ultrasonic treatment of flora with bio varnish, there was a significant decrease in the number of strains of the following bacterial species: *S. aureus*, *S. epidermidis*, *S. salivarius*, *N. mucosa*. Representatives of such species as *K. pneumoniae*, *Candida*, *E. coli*, *R. mirabilis* were not detected in the crops on the 7th day of treatment, which notes the pronounced antiseptic activity of the solution in combination with the action of ultrasound.

Table No. 8. The number of strains and adhesive properties of microorganisms isolated from the oral cavity in patients with mandibular fractures in group II (n=109)

Genus and species of microorganisms	1 day		3 day		7day	
	Number of strains	Adhesive strains (number/%)	Number Of strains		Number of strains	Adhesive strains (number/%)
Род Staphylococcus	79	54/68,3	42	33/78,5	19	9/47,3
S. aureus	42	23/54,7	23	18/78,02	11	5/45,5
S. epidermidis	37	21/56,7	19	15/78,9	8	4/50
Род Streptococcus	14	12/37,5	19	13/68,4	6	3/50
S. pyogenes	2	1/33,3	2	2/100	1	-
S. faecalis	7	6/85,7	3	2/66,6	1	-
S. salivarius	20	3/15	12	7/58,3	3	2/66,6
S. mutans	2	2/100	2	2/100	1	1/100
Род Neisseria	14	3/21,4	5	3/60	2	1/50
N. mucosa	11	2/18,1	3	2/66,6	1	-
N. sicca	3	1/33,3	2	1/50	1	-
Enterobacteriaceae	13	13/100	6	6/100	2	2/100
K. pneumoniae	3	3/100	2	2/100	-	-
Enterobacter	5	5/100	2	2/100	-	-
Pseudomonas	5	5/100	3	3/100	1	1/100
Candida	3	3/100	1	1/100	-	-
E. coli	4	4/100	2	2/100	-	-
P. mirabilis	1	1	1	1	-	-

Changes in the results of clinical and microbiological studies in patients with mandibular fractures

In the group in which the oral cavity was treated with a solution of furacillin, chlorhexidine and a solution of liquid bufidumbactrin, orthopedic treatment and the appointment of the drug Serrata, additional to traditional drug therapy (including Azithromycin), traumatic soft tissue edema decreased by 4-5 days, soft tissue infiltration decreased by 4-6 days, pain syndrome was stopped for 4-5 days.

In the I – group of 122 patients, we used a number of medications, which is aimed at preventing infection with subsequent necrotization of soft tissues and from the bone tissue itself. In this group, Furacilin, Chlorhexidine, Bifidumbacterin were prescribed in addition to these drugs, the drug Azithromycin, a broad-spectrum antibiotic from the azalide group, was included. These drugs are used as therapy of fractures of the mandible (mandible) and prevention of purulent - inflammatory complications of the corresponding parts of this area.

During the period of treatment with PNH, all patients were in the hospital, the department of ChLH at the BOMMC was hospitalized for emergency indications and in accordance with the appropriate procedure. All patients took medications that are listed above according to the scheme and according to the medical standard and taking into account the patient's condition, the nature of traumatization of the lower jaw and nearby soft tissues of the lower jaw, etc.

In group II, 109 patients were treated with drugs aimed at eliminating post-traumatic complications and their various clinical forms. At the same time, Sextophagus, Serrata, Florbiolact were used as one of the drugs, and Azithromycin was additionally included in these.

In the course of the study, the dynamics of a decrease in post-traumatic complications in the soft tissue area, the intensity and duration of pain syndrome, a decrease in the number of days of temporary disability in individuals in the group using the above drugs with complex pathogenetic therapy were observed.

Clinical observation of patients with complicated PNH showed a decrease in post-traumatic soft tissue edema in the fracture area for 3-4 days, soft tissue infiltration was not detected for 4-5 days, pain syndrome was stopped for 3-4 days. Temporary disability in patients in this group was 22.3 ± 1.1 days.

Factors that provoke inflammatory complications in fractures of the lower jaw.

Posttraumatic osteomyelitis was observed in 109 patients as a result of observations of 231 patients with fractures of the lower jaw. The causes of the development of post-traumatic osteomyelitis have been studied, which include the following: 1. Late treatment of patients for specialized medical care, in 19 patients with fractures of the lower jaw. 2. Ineffective fixation and reposition of bone fragments of the lower jaw, in 21 patients. 3. Soft tissue damage in the area of the fracture line, in 14 patients. 4. Uncut teeth and tooth roots located in the fracture gap in 21 patients. 5. Damage to the neurovascular bundle, in 5 patients. 6. Reduction of general and local nonspecific protection of the body, in 11 patients.

The above data were observed in open fractures of the mandible with unilateral and bilateral localization, in the area of the canine, angle of the jaw, with central and mental fractures, fracture of the body of the mandible and with double fractures of the jaw.

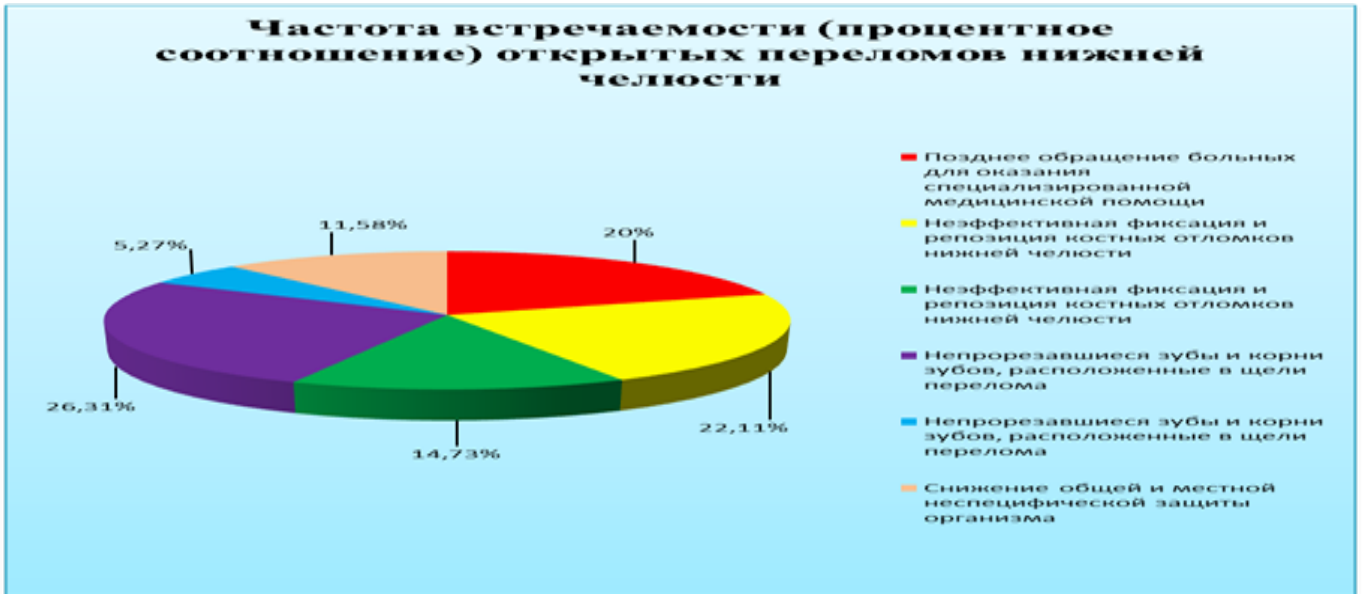


Figure 1. Frequency of occurrence (percentage) of open fractures of the mandible

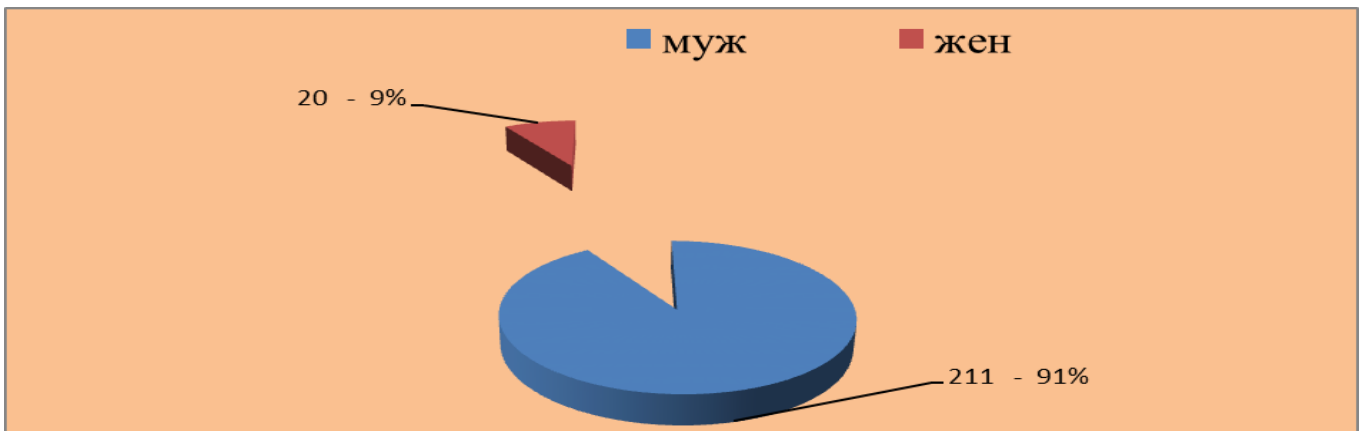


Figure 2. Frequency of occurrence (percentage) of women and men with open fractures of the mandible



Figure 3. Frequency of occurrence of various groups of fractures depending on the degree of displacement of fragments

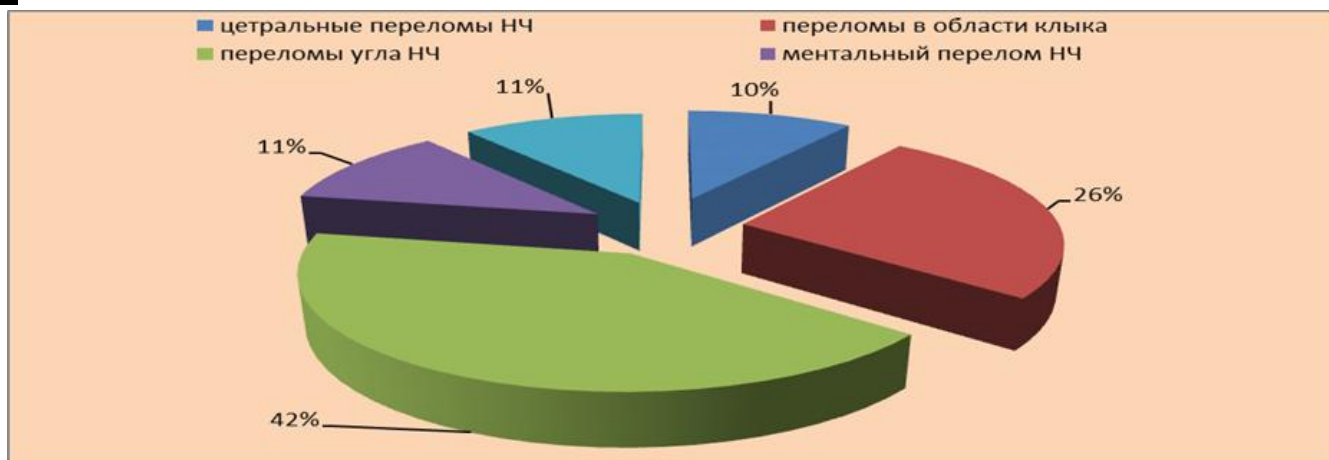


Figure 4. Fracture frequency: central, mental, fractures in the area of the body, canine and angle of the lower jaw (depending on the area of contact of the tooth located in the fracture gap with the periodontal of this tooth).

The analysis of 212 patients with open PNPs was carried out, depending on their localization (Table 10). 182 patients had a unilateral fracture of the LF, 30 had a bilateral fracture of the LF, and 19 had a closed fracture of the LF. If all the previously mentioned fractures of the lower jaw are taken as 100%, then all these patients were put on inpatient treatment. They had a fracture line in the following areas: with a central fracture, the number of patients was 22 (9.52%), in the canine area – 57 (24.67%), mental - 25 (10.82), in the body area - 24 (10.38), in the area of the angle of the lower jaw - 93 (40.25%), in areas of the articular process – 10 (4.32%). There were 19 women in the survey (8.22%), and 212 men (91.78%).

In central fractures of the mandible, there was no displacement of bone fragments, radiographic bone tissue disorders were present in the form of a "thin thread or hair" in 9.52% (group I) and the minimum displacement (group II) was in the canine area – 24.67%, the angle of the mandible 40.25%, mental - 10.82, in the body area – 10.38.

With fractures of the lower jaw, with mixing in two or three places, a fracture line is marked, as well as a rupture occurs in the intraalveolar neurovascular bundles. As a result of this process, bone fragments become distant from each other. When treated with conservative orthopedic fixation, the Tigerstedt splint on both jaws and bone fragments damage the neurovascular bundle, as a result of which innervation and microcirculation are disrupted. In these positions, there is a complication with posttraumatic osteomyelitis[29].

Results of diagnostic examination of patients with fractures of the lower jaw

One of the modern methods of examination of patients with fractures of the lower jaw and face is the radiation diagnostic method. Currently, this type of examination includes many research methods, namely radiography of the jaw bones in different projections, computer and magnetic resonance imaging.

To achieve this goal, in the departments of maxillofacial surgery of the Bukhara Regional Multidisciplinary Medical Center and the Tashkent State Dental Institute, we examined 231 patients with fractures of the lower jaw and with complicated forms. We divided all the subjects into the following groups: group I - 122 patients who underwent only conventional radiographic examination methods in different projections; group II - 109 subjects who underwent computed tomography of the mandible; magnetic resonance imaging (CT, MSCT) was used for the examination; group III - practically healthy people - 35 patients were compared with control groups.

With respect to group I, which included 122 patients, in order to detect the presence of traumatic damage to the lower jaw, conventional radiographs were used, performed in different projections, namely, straight, axial, sagittal and lateral. However, the presence of inflammatory processes (foci of inflammation, fistulous passages, discharge of purulent exudate and sequestration from the fracture zone, hyperemia, suppurated hematomas, etc.), i.e. complications developing in bone and parotid soft tissues, using conventional X-rays it is impossible to determine the images (sighting, survey, orthopantomograms, etc.).

In the next II group, which included 109 patients with traumatic injuries of the lower jaw, diagnosis during hospitalization and throughout the entire treatment period was carried out, in addition to other examination methods (clinical, laboratory, microbiological) based on computed tomograms.

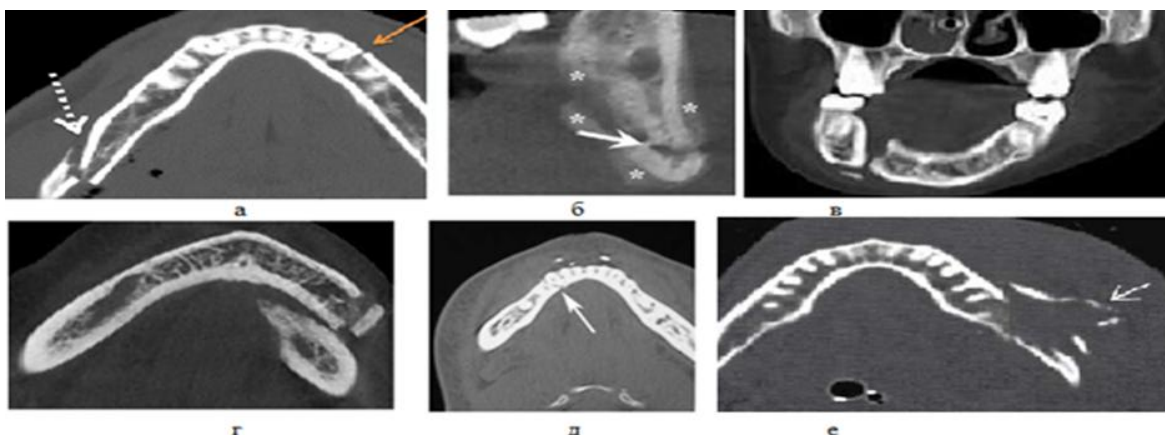


Рисунок 5. Ортопантограммы больных с переломами нижней челюсти

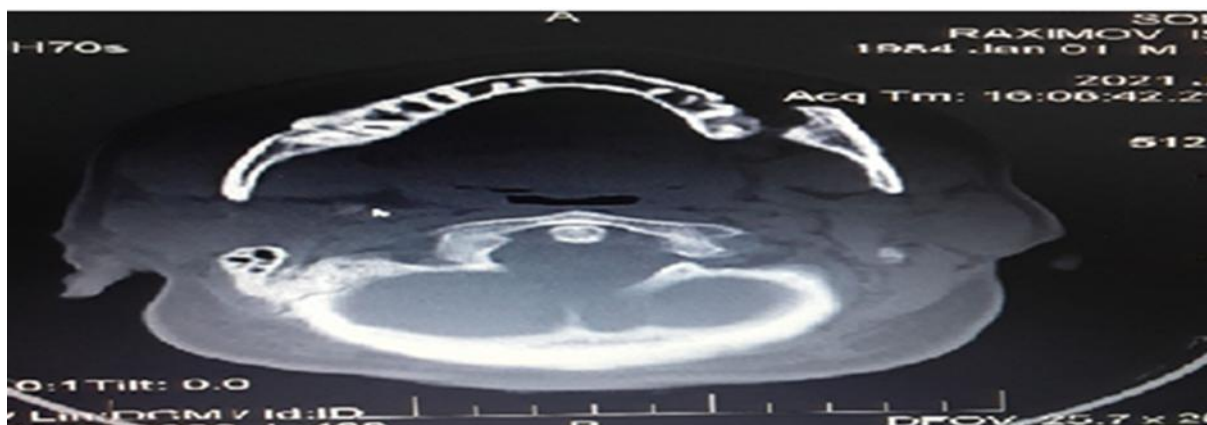


Figure 6. Computer tomograms of patients with fractures of the lower jaw.

The methods of radiation diagnostics used by us were radiography, orthopantomography, cone beam (CBCT) and multispiral (MSCT) computed tomography. Based on computer tomograms, we received detailed information about the presence and number of traumatic injuries, about the location of the fracture gap of the lower jaw, we could detect small bone fragments that may not be visible on a normal X-ray (Figure. 5.7).

The second group of subjects consisted of 109 patients in whom the method of magnetic resonance imaging was used during the diagnosis and during the examination. This radiation examination method is based on visualization of soft tissue structures by fixing the properties of water molecules changed in a magnetic field and is considered the most sensitive when examining tissues located near joints and provides information about the condition of intra-articular discs, the presence of hematomas in the cavity of the articular bag and violation of the integrity of the joint capsule.

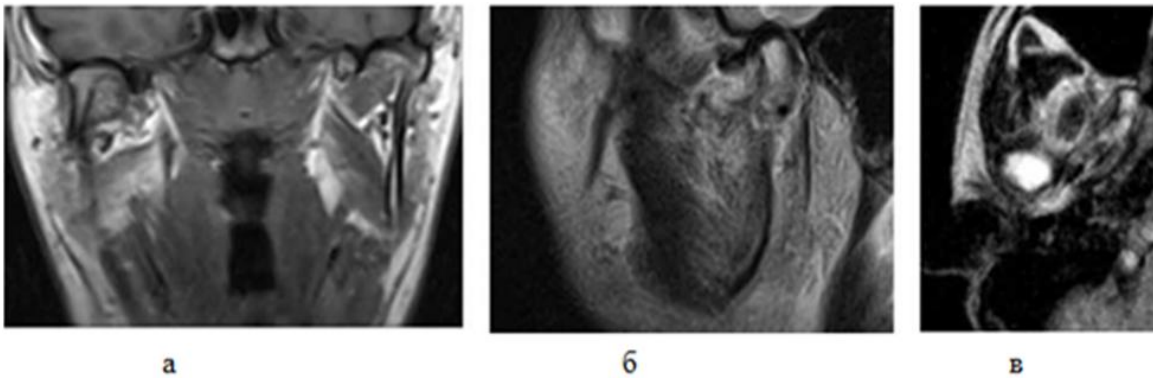


Figure 7. T-1 (a) and T-2 weighted (b, c) MSCT images of patients from the surface of fragments of the mandible, white-fracture cracks. On MSCT with 3D reconstruction at the stage of immobilization of fragments.

In those clinical cases where damage to the blood vessels supplying the lower jaw is implied, it is possible to use MSCT using contrast agents (Figure. 7). With this method of research, an intravenous injection of a special substance is performed, which has the property of being clearly displayed in the image under magnetic field conditions.

In cases of reparative osteogenesis of bone fragments of the lower jaw, complications may develop, one of which is suppuration of the bone wound. At the same time, it is possible to detect the presence of mobility between the bone fragments of the lower jaw, which is noted during its movement. This is characterized by the fact that on the outer surface of the fragments of the lower jaw, the presence or absence of a periosteal reaction is always revealed, which manifests itself in the form of thickened hyperechoic bands.

Consequently, according to the results obtained as a result of the work done with patients with uncomplicated and complicated PNH, we can talk about the advantages and negative sides of radiation examination methods in this contingent of patients[27.28.29].

Thus, in order to eliminate the above-described shortcomings identified when using each type of radiation diagnostic method, we examined groups I, II with a total number of patients with PNH – 231 patients. All of them underwent a joint comprehensive diagnostic examination using various radiation research methods (radiography, CT, MSCT).

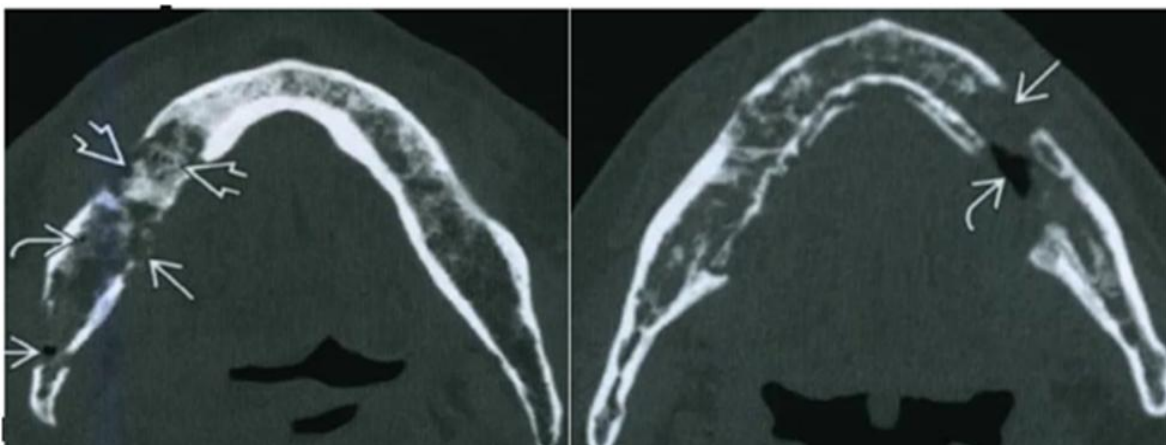


Figure 8. Electron beam computed tomography (CBCT) with posttraumatic osteomyelitis of the lower jaw on the left and right.

Therefore, on cone-beam computed tomography (CBCT), normally and in the first days after injury, the periosteum is represented by a thin continuous hyperechoic line that evenly covers the bone structures (Figure. 8), and the appearance of a periosteal reaction occurs when osteogenesis is activated at different stages of consolidation of fragments and stages of inflammatory processes.

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