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## EFFICIENCY OF PRE-PROSTHETIC PREPARATION OF THE ALVEOLAR PART OF THE MANDIBLE IN PATIENTS WITH PARTIAL ADENTIA

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The tooth extraction leads to the development of horizontal and vertical atrophy of the alveolar process of the jaws. In approximately 90 % of cases, it is necessary to perform one or another type of bone augmentation. The purpose of this study was to study the effectiveness of the use of bone substitutes in the restoration of a tooth row defect after tooth extraction. The obtained results of a comparative study of the state of the optical density of bone tissue of the mandibular alveolar socket in patients at different stages of bone tissue reconstruction objectively proved the presence of a gradual increase in bone tissue density in the areas of application of osteoplastic materials. Densitometric indicators of patients were kept within the upper limit of average values (132±13, 147.2±24.34, 160.3±14.58 units).

**Key words:** bone augmentation, tooth extraction, adentia, bone atrophy,

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## ЕФЕКТИВНІСТЬ ПЕРЕДПРОТЕЗНОЇ ПІДГОТОВКИ АЛЬВЕОЛЯРНОЇ ЧАСТИНИ НИЖНЬОЇ ЩЕЛЕПИ У ХВОРИХ З ЧАСТКОВОЮ АДЕНТІЄЮ

Видалення зуба призводить до розвитку горизонтальної та вертикальної атрофії альвеолярного відростка щелеп. Приблизно в 90 % випадків необхідно виконати той чи інший вид кісткової аугментації. Метою даного дослідження було вивчення ефективності використання кісткових замінників при відновленні дефекту зубного ряду після видалення зуба. Отримані результати порівняльного дослідження стану оптичної щільності кісткової тканини альвеолярної частини нижньої щелепи у пацієнтів на різних етапах реконструкції кісткової тканини об'єктивно підтвердили наявність поступового збільшення щільності кісткової тканини в зонах застосування остеопластики. матеріалів. Денситометричні показники хворих утримувалися в межах верхньої межі середніх значень (132±13, 147,2±24,34, 160,3±14,58 од.).

**Ключові слова:** кісткова аугментація, видалення зуба, адентія, атрофія кістки.

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The rapid development of dental science and the progress of modern technologies of treatment of main stomatological diseases did not lead to a drastic reduction and improvement of the state of the dento-maxillar complex in the Ukrainian population. An alarming trend is observed among children with massive carious disease, which leads to premature loss of teeth and normal functioning of the maxillofacial system [1, 3, 9].

Such patients require aesthetic and functional restoration of the dento-maxillar complex, and, almost always, a multidisciplinary approach to solving this problem [12].

The presence of defects leads to a loss of full function and a violation of the normal growth and development of the dento-maxillar complex, which is combined with aesthetic problems and has a negative impact on psychosocial conditions [5, 12]. Numerous of authors get a conclusion that the chewing apparatus is a complex that consists of elements that are anatomically and functionally united, and it is clear that with a violation or absence of one of the elements of this system, we should expect changes in the functioning others, in accordance with the law on mutual conditioning of form and function [6]. The adentia leads not only to a lack of bone tissue in this area, but also inhibits the development of the entire chewing apparatus, and these changes will be more significant for the maxilla [2, 3, 8]. Numerous factors also affect the processes of atrophy of the alveolar process after tooth extraction, namely: bacterial insemination, osteoporosis or other general somatic diseases [5, 10, 13].

Therefore, it is important to ensure the possibility of preventive measures regarding the atrophy of bone tissue in the area of the alveola of extracted tooth, which is possible due to the development and approval of dental osteoplastic materials and the implementation of new methods of treatment [4].

**The purpose** of the study was to establish the effectiveness of the use of bone substitutes in the restoration of a tooth row defect after tooth extraction.

**Material and methods.** During the clinical research, 69 clinical cases were analyzed, that were divided into 3 groups, depending on the method of surgical preparation - directed tissue regeneration, and a control group. 1<sup>st</sup> group – patients, who got the replacement of bone defect by Bio-Oss® (n=24); 2<sup>nd</sup> group – patients, who got the replacement of bone defect by dental autograft (n=24); control group – who

did not get the replacement of bone defect (n=21). Taking into account the similarity of the structure of the bone substitutes and the method of carrying out the restoration of the defects of the alveolar part with their help, the clinical and radiological analysis of the patients was carried out only for two groups of observations, where the replacement the above-mentioned defects were repaired using Bio-Oss® material and dental autograft. The following observation periods were chosen: before treatment, 10 days and 6 months after treatment.

The state of tooth mobility after surgical preparation has an important clinical value. because this clinical indicator characterizes the recovery processes in the periodontal tissues. Assessment of tooth mobility was carried out using periostometry by the "Periotest-M" device. The degree of tooth mobility is an objective indicator of the degree of destruction of bone tissue.

Pathological and physiological tooth mobility was determined using the Periotest-M device, i.e. periostometry, which is an automated pulse method for studying the degree of tooth mobility. The inspection scheme is standardized, proposed by the manufacturer.

The research data were processed by the method of variational statistics on a personal computer with the determination of the reliability of differences between the values of the studied indicators, as well as by the method of correlation using the Statistica program package and Excel 2010 spreadsheets.

**Results of the study and their discussion.** In the course of the study, the frequency of surgical preparation of the alveolar part of mandible for orthopedic treatment was determined 40 % in the frontal and 23 % in the distal area (Fig. 1, 2).

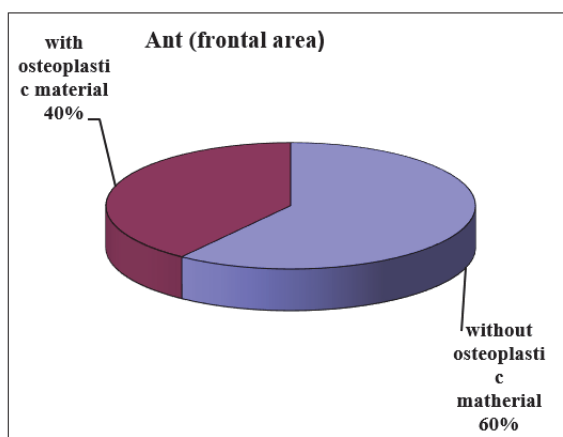


Fig. 1 Frequency of surgical preparation of the alveolar part of mandible (frontal area)

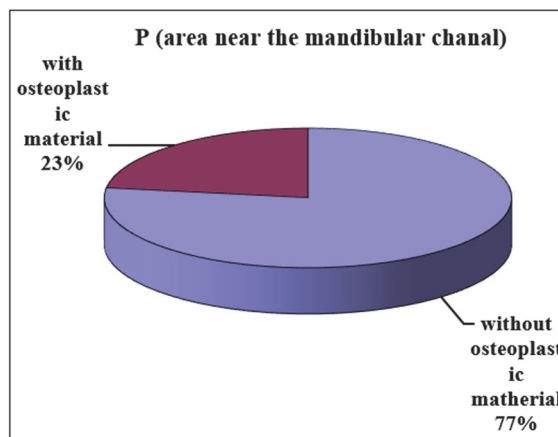


Fig. 2 Frequency of surgical preparation of the alveolar part of mandible (distal area)

Totally, the orthopedic rehabilitation of patients with the use of dental implants was carried out: without additional surgical interventions – in 44 % of cases, with additional surgical interventions – in 56 % of cases. According to many scientists, in approximately 90 % of cases, it is necessary to perform one or another type of bone augmentation. Augmentation was necessary in 36 % of cases, appropriate in 57 %, with the aim of achieving good aesthetics - in 70 % of cases, carried out in 61 %.

The task of modern prosthetic dentistry and reconstructive surgery is the formation of a functional biological platform for support or retention mechanisms, which will serve as a support for subsequent orthopedic rehabilitation this and do not cause further loss of bone and soft tissues after tooth extraction. During analysis of sources of scientific and medical information, the goal was to determinate the current trends in modern surgical preparation for orthopedic treatment. It was established that today there are a large number of methods, materials and surgical techniques for the preparation of the alveolar socket for further orthopedic treatment, however, there are not clear indications for their use yet [15].

One of the most predicted methods of augmentation of small defects of alveolar socket is directed tissue regeneration, which involves the establishment of a membrane or other physical barrier to separate soft tissues from the underlying tissue. of a tissue defect, which allows creating a space for the repopulation of bone cells and bonerestoration. Similar data about the reparative osteogenesis after tooth extraction were obtained by other authors [11].

The choice of the method of surgical preparation depended on the anatomical conditions of the site where the implantation were planned, as well as, in the 3rd group, depending on the wishes of the patients. It is interesting that with similar defects, in certain situations, it is possible to avoid significant surgical interventions associated with the collection of extracorporeal transplants, and to use the residual potential to the maximum. In our case, the use of the method of production an autotransplant from an extracted tooth is fully justified and appropriate.

In general, the frequency of use of surgical preparation for the mandible was 40 % in the frontal area and 23 % in the distal area. Therefore, the results of the conducted studies allow us to say that the use of one or another method of surgical preparation depends on the size and type of the defect.

Despite the extremely wide range of considered bone-plastic materials, the “gold standard” for the implantation is the autogenous bone tissue. However, the main disadvantages of bone autotransplantation are: the need to inflict additional trauma; blood loss (symptomatic anemia); the need for appropriate anesthesiological support; insufficient amount of tissue and mismatch of its quality indicators; prolonging the time of operative intervention; unpredictable resorption of transplants in the distant postoperative period, etc. It is known that the effectiveness of bone autoplasty for the reconstruction of atrophied jaws is 72–75 %.

The lowest mobility was found in the mandibular molars and the highest in the mandibular incisors of the control group of patients. After surgery, on the 10th day, slightly increased tooth mobility was noted in the observation groups (Table 1).

Table 1

**State of tooth mobility in patients with dentition defects (M±m) before treatment and on the 10th day after surgery**

Group		Tooth mobility (point)
I	Before treatment	+22.56±0.33
	10-th day	+17.12±0.26 *
II	Before treatment	+22.26±0.19
	10-th day	+17.13±0.19 *

Note. \* –  $p < 0.05$  relative to the previous term of the study.

Clinical observations, which were conducted after 3 months, established the deterioration of mobility indicators in all groups. The indicators of tooth mobility in group II were statistically significant decreased compared to group I. On average, for the 3rd month, the indicators of tooth mobility of patients of the II group decreased by 50.84 %, and the indicators of the I group – by 41.28 % from the initial level ( $p < 0.05$ ). The decrease in tooth mobility in patients of the I group was significantly lower and amounted to 35.31 %. Therefore, the lowest mobility indicators +11.09±0.23 points were obtained in the II group ( $p < 0.05$ ), which testified to the positive effect of the proposed method of surgical preparation of the bone tissue from development of a dental autotransplant and its high efficiency (Table 2). After 6 months of observation, such indicators of patients of group II were determined: mandibular molars +5.38±0.36 point and patients of group I: mandibular molars +10.09±0.27 point ( $p < 0.05$ ). The most effective way to reduce mobility compared to the indicators of tooth mobility before treatment was in groups I and II, respectively: by 43.53 % and 57.89 %. The lowest statistically significant total mobility index of the II group compared to the other group after 6 months was +9.50±0.23 points ( $p < 0.05$ ), which proves the high effectiveness of the proposed method of treatment.

Table 2

**State of tooth mobility in patients with dentition defects (M±m) before treatment and 3 months after surgery**

Group		Tooth mobility (point)
I	Before treatment	+22.56±0.33
	3 months	+13.07 ±0.36 *
II	Before treatment	+22.26±0.19
	3 months	+11.09±0.23

Note. \* –  $p < 0.05$  relative to the previous term of the study.

The study of clinical indicators of changes in vertical dimensions after surgical interventions showed that in the II group, where the vertical dimensions increased on average by 10.35±0.05 %, which was significantly less than the data of the I group. Therefore, the smallest swelling of soft tissues was in group II, where a dental autograft was used for the purpose of osteoplasty, which proves the high antiinflammatory properties of the proposed method.

If it is necessary to carry out dental implantation in patients with alveolar socket defects, it is advisable to carry out surgical preparation with the use of bone-plastic materials for directed osteosynthesis in the area of the implanation, which shortens the duration of treatment by 1.5–2 times without reducing its quality. In patients with the such defects, we have recommend the use of the technique of directed bone regeneration using a dental autotransplant.

The obtained results of a comparative study of the optical bone density of the mandibular alveolar socket in patients at different stages of bone reconstruction objectively and proved the presence of initial

vision reduced density of bone tissue in the areas of osteoplastic material fixation. Research confirms that at the moment of completion of bone reconstruction and the beginning of orthopedic treatment (with the help of dental implants and bridge prostheses), the value of the specific density of bone tissue reaches high values, which causes osseointegration of implants and normalizes the remodeling of tissue, which contributes to the slowing down of atrophy processes and the extension of the term of functioning non-removable bridge prostheses [8, 12].

However, many unsolved issues remain for the orthopedic rehabilitation of stomatological patients, especially the surgical preparation of the alveolar proccesses for future orthopedic treatment and quality improvement those of abutment teeth when using non-removable bridge prostheses. Unfavorable conditions for orthopedic treatment often exist in the oral cavity, which are often observed after the tooth removal, as well as with acquired pronounced atrophy of edentulous areas of the jawis. In such cases, surgical preparation with further orthopedic treatment is necessary. The obtained data did not contradict to results of literature search [11, 14].

### Conclusion

The obtained results of a comparative study of the state of the optical density of bone tissue of the mandibular alveolar socket in patients at different stages of bone tissue reconstruction objectively proved the presence of a gradual increase in bone tissue density in the areas of application of osteoplastic materials. Densitometric indicators of patients were kept within the upper limit of average values ( $132 \pm 13$ ,  $147.2 \pm 24.34$ ,  $160.3 \pm 14.58$  units).

The method of treatment proposed by us revealed a tendency to increase the stability indicators of dental implants. The highest average values of the coefficient of stability of implants were in patients who underwent surgical preparation of the alveolar process using a dental autograft of own production with subsequent dental implantation ( $73.26 \pm 1.7$  units) and were statistically significantly different from the indicators of another group of observations ( $p < 0,05$ ).

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