

## Comparative Evaluation of the Effectiveness of Surgical Treatment of Chronic Generalized Periodontitis.

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**Abstract. Purpose.** To evaluate the prognostic value of the use of cone beam computed tomography in assessing the results of surgical treatment of chronic generalized periodontitis.

**Materials and research methods.** To achieve this goal, the results of surgical treatment of 90 patients with severe generalized chronic periodontitis were analyzed. The age of the patients was  $45.0 \pm 15.6$  years. All patients were divided by simple randomization into 2 groups: group 1 - the main group (53 patients), where autobone was taken, taken from the upper jaw hillock or from the retromolar space of the lower jaw. Group 2 — control group (37 patients), where resorbable membranes were used to replace the wound bone defect.. Statistical processing of the material was carried out using the Student-Fisher test, the nonparametric Mann-Winnie test, Wilconson.

**Results.** After surgical interventions in patients with chronic generalized periodontitis, serious postoperative complications were rare. Moderate pain on the second day after surgery was noted by 18 patients (7.0%) of the main group and 22 patients (11.0%) of the comparison group. The terms of primary wound healing averaged  $6.56 \pm 0.4$  days in the main group, in the comparison group -  $9.16 \pm 0.7$  days ( $p < 0.05$ ). On 3-D computerized dental tomography, the zone of granulation of bone tissue is visible in the main group, foci of bone tissue appear, gum recession decreases by 87.6% ( $p \leq 0.05$ ), areas of the leukocyte shaft appear, which indicates to the body's response to osteoplastic material. In the study of bone tissue growth 12 months after surgery according to DVT (dental volume tomography) for triple-walled bone defects, this value was  $2.2 \pm 1.6$  in the main group and  $1.5 \pm 1.0$  in the control group. The differences between the two groups were statistically significant ( $P \leq 0.05$ ).

**Conclusions:** Summarizing the above, it can be confirmed that in patients of the main group there is a decrease in bone tissue atrophy, an improvement in bone pattern, an increase in trabecular and lacunar bone, which is proved by the study.

**Key words:** autobone; resorbable membranes; cone beam computed tomography; chronic generalized periodontitis

**Introduction.** A WHO report (2019), based on a population survey of 53 countries, revealed a high incidence of periodontal disease in the world. Its frequency increases with age: 15-19 years of periodontal disease occur in 55 -

89%, at the age of 35 -44 years - in 65 - 98%. In older age groups, they reach 98% [1]. High tendency to progression, the prevalence of periodontal inflammation at a young age, difficulties in achieving stable remission, polyetiologicity, as well as atrophy and severe periodontal destruction, low accessibility to treatment of a large mass of the population require the need to solve this problem.

Since it is proved that *Porphyromonas gingivalis* plays the main role in the development of periodontitis [2]. These bacteria are able even in minimal amounts to increase the virulence of the entire community. Instead of being an inducer of inflammation, *Porphyromonas gingivalis* manipulate the body's response. Suppressing innate immunity, this bacterium integrates into the connection between Toll-like receptors and the host organism, weakening the defense of the macroorganism, which leads to uncontrolled growth of the entire community. Further along the chain of occurrence of periodontitis, it follows that the inadequate, and sometimes even negative, response of the host organism leads to insufficient expression of genes that regulate the activity of cytokines associated with various subgroups of T-helpers [3-7].

There are many x-ray methods for determining the effectiveness of the treatment of inflammatory and dystrophic periodontal lesions. One of the most sought after is CBCT (cone beam computed tomography). The role of CBCT in periodontics is difficult to overestimate. So CBCT helps in detecting initial changes in lamina dura, which cannot be seen on conventional digital radiographs. With gingival inflammation, loss of alveolar bone, irregularities in the bone contour, such as discrepancy and fenestration, all this can be seen only on CBCT. With fenestration, the marginal bone remains intact, while with a discrepancy, inflammation also affects the marginal bone. CBCT can also provide more accurate information on the initial changes occurring in the cancellous bone [8-10].

In addition to controlling inflammation and periodontal infection, the regeneration of the supporting structure is one of the goals of modern periodontal therapy. The goal of regenerative periodontal therapy is to reduce the sounding depth, treat bone defects, and periodontal ligament regeneration. Estimating bone loss during routine radiography may be inadequate due to image overlay. CBCT can help in the amount of substitute material needed to fill the defect and thus solve the problem of regenerative therapy [11-15]. However, in the available literature there is little information about the use of autobone for periodontal regeneration, and x-ray images are rather scarce and do not reflect the real situation of the problem, so we consider it relevant to conduct such a study.

**The aim of the study.** To evaluate the prognostic value of the use of cone beam computed tomography in assessing the results of surgical treatment of chronic

generalized periodontitis.

**Materials and research methods.** To achieve this goal, the results of surgical treatment of 90 patients with severe generalized chronic periodontitis were analyzed. The age of the patients was  $45.0 \pm 15.6$  years. All patients were divided by simple randomization into 2 groups: group 1 - the main group (53 patients), where autobone was taken, taken from the upper jaw hillock or from the retromolar space of the lower jaw. Group 2 — control group (37 patients), where resorbable membranes were used to replace the wound bone defect. All patients were examined clinically, radiologically. All patients gave voluntary consent to participate in the experiment. Statistical processing of the material was carried out using the Student-Fisher test, the nonparametric Mann-Winnie test, Wilconson.

**Research results.** The absence of signs of an inflammatory process in the periodontium and a good hygienic condition of the oral cavity were mandatory before performing surgical treatment using directed regeneration of periodontal tissues.

Surgical treatment was started a month after preoperative preparation, making sure that patients achieved stabilization of oral hygiene. After surgical interventions in patients with chronic generalized periodontitis, serious postoperative complications were rare. Moderate pain on the second day after surgery was noted by 18 patients (7.0%) of the main group and 22 patients (11.0%) of the comparison group. The condition of the tissues in the area of the surgical wound in these patients was characterized by slightly pronounced hyperemia, swelling of the mucosal-periosteal flaps, and pain on palpation. Moreover, these phenomena did not extend to nearby sections of the mucous membrane of the alveolar processes. Submandibular lymph nodes were not involved in the inflammatory process of the operation zone. By 3-4 days in these patients, the color of the flaps indicated a sharp decrease in the processes of hyperemia, there was only a slight reddening and swelling, which disappeared by 5-6 days in all subjects. On the 7-10th day after the operation, complete epithelialization of the wound was observed, which was an indication for the removal of sutures in this category of patients. Significant exudation (including bleeding), severe soreness and swelling of the mucoperiosteal flaps 2-3 days after surgery and directed tissue regeneration occurred in 2 cases (0.7%) in patients of the main group and in 22 patients (11,0%) comparison groups. The severity of the described symptoms of the inflammatory process in the area of surgical interventions disappeared on the 7-10th day. In these terms, we started to remove the stitches.

The terms of primary wound healing averaged  $6.56 \pm 0.4$  days in the main group, in the comparison group -  $9.16 \pm 0.7$  days ( $p < 0.05$ ).

**Fig. 1. The frequency of clinical signs of postoperative complications in patients of the main and comparison groups with chronic generalized periodontitis.**

On 3-D computerized dental tomography (Fig. 2.), the zone of granulation of bone tissue is visible in the main group, foci of bone tissue appear, gum recession decreases by 87.6% ( $p \leq 0.05$ ), areas of the leukocyte shaft appear, which indicates to the body's response to osteoplastic material. But, after 12 months, the zone of inflammation disappears, a trabecular plate of bone tissue appears, lacunar resorption disappears.

**Fig. 2. Single-wall bone defect at the level of 2/3 of the root length**

Radiation diagnostics was performed before treatment and 12 months after surgical interventions. The reduction in the number of stages was associated not only with the desire to reduce the dose of radiation exposure for patients, but also with the fact that changes in the periodontal bone tissues occur slowly, and the possibility of detecting them on orthopantomograms and dental volumetric tomograms appears no earlier than after 8- 12 months after surgical procedures

Since mesenchymal stem cells and osteoblast progenitor cells can be identified in the periodontal ligament, it was possible to study bone augmentation data to obtain bone tissue in the region of the maxillary tuber and the chin and retro-molar region of the lower jaw. Since one of the most physiologically effective methods is the use of cytokines, the most important reservoir for finding cytokines is autologous bone. When using autologous bone as a donor material, in the main group, 92% of patients experienced an increase in the alveolar ridge for 9 months of treatment, which is consistent with the data of Muracami Sh, 2018). This suggests that the local use of autologous bone is effective in the regeneration of periodontal tissues. In addition, its effectiveness is higher compared with allografts.

**Fig. 3. Obtaining a bone autograft in the region of the hillock of the upper jaw**

In a comparative study of the degree of filling of the aforementioned bone defects with newly formed bone tissue 12 months after the operation according to the results of CBCT, a significantly higher degree of filling of type I defects with bone tissue was established in the main group, where autobone was used during the operation, compared with the control group, where resorbable membranes were used.

Along with this, in order to randomize ongoing studies in the classification of bone defects and conduct a comparative assessment of the effectiveness of surgical treatment, we took as a guide the number of walls at a level  $\frac{1}{2}$  of the root length.

**Table 1. Depth of bone pockets and bone growth in various types of bone defects.**

In the study of bone tissue growth 12 months after surgery according to DVT (dental volume tomography) for triple-walled bone defects, this value was  $2.2 \pm 1.6$  in the main group and  $1.5 \pm 1.0$  in the control group. The differences between the two groups were statistically significant ( $P \leq 0.05$ ).

**Figure 4. Two-wall bone defect before and after autoplasty.**

In cases where double-walled bone defects were filled with autologous bone (main group), bone growth was  $1.4 \pm 0.3$ , and in cases when resorbable membranes were used (control group),  $1.0 \pm 0.2$ . When filling single-wall bone defects with autologous bone, the growth of bone tissue was  $0.7 \pm 0.2$  (Fig. 4.5), when filling with resorbable membranes, it was  $0.3 \pm 0.05$ . The differences between the main and control groups were also statistically significant ( $P \leq 0.05$ ).

Thus, during the study of the degree of filling of bone defects with newly formed bone tissue (as a percentage of the initial volume of a bone defect, according to dental volume tomography) in patients suffering from severe chronic generalized periodontitis, a significantly higher degree was established 12 months after surgical treatment filling with bone tissue of defects of type I (in the presence of two bone walls at the level of  $\frac{1}{3}$  of the root length and three walls at the level of  $\frac{1}{2}$  root length) in the main group, where during era tio autobone was used, compared with the control group, where the resorbable membrane used ( $P < 0.05$ ).

**Conclusions:** Summarizing the above, it can be confirmed that in patients of the main group there is a decrease in bone tissue atrophy, an improvement in bone pattern, an increase in trabecular and lacunar bone, which is proved by the study.

**Acknowledgments.**

I want to express my gratitude to my supervisor, Doctor of Medicine, Prof. Rizayev Zhasur Alimjanovich for a sensitive and subtle understanding of the underlying mechanisms that occur in the maxillofacial region and for the warm attitude to the researcher.

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