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D.Yu. Avedova, Yu.L. Osipova, L.A. Zyulkina, A.V. Yurkevich, I.D. Ushnitsky

EFFICIENCY OF USING AUTOGENIC BONE IN COMBINATION WITH A XENOGENIC BONE MATERIAL FOR GUIDED BONE TISSUE REGENERATIONIN AN EXPERIMENT

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Currently, the search for effective methods of reconstructive interventions aimed at increasing alveolar ridge height and thickness remains a pressing issue in dentistry. However, the results of studies on the comparative assessment of the effectiveness of the use of autogenic bone from various donor sites are extremely small and ambiguous. **Aim.** Substantiate the effectiveness of using the optimal composition of autogenic bone chips (ABC) and xenogenic bone material (XBM) taking into account the anatomical localization of the donor zone in guided bone regeneration (GBR) according to the data of microhemodynamics of the experiment. **Research materials and methods.** The object of the study in the research was 84 sexually mature male rabbits of the chinchilla breed weighing 2500-3200 g. The materials of Cardioplant LLC (Penza) with registration certificates: Xenogenous bone material (XBM) "Xenograft Mineral" (medical device registration certificate No. RZN 2015/3086 dated 16.09.2015) and bioresorbable membrane "BioPLATE Barrier" (medical device registration certificate No. RZN 2016/4808 dated 26.01.2021). A defect in the mandible area was formed in the animals under study, which was then filled with osteoplastic material. Laser Doppler flowmetry (LDF) was used to monitor the state of microhemodynamics of gingival tissues in the area of surgery using a laser analyzer of capillary blood flow "LAKK-02," (NPP "Lazma," Moscow). Results and discussion. It was established that within the first two weeks after the intervention, optimal rates of microcirculation recovery in the surgical area are characteristic of osteoplasty using a mixture of XBM (75%) and ABC (25%) from the oral donor zone. On the 14th day after the operation, capillary blood flow was stabilized, which was manifested by a decrease in the studied parameters in all observation groups. However, the normalization of microvessel functioning was not the same in the study groups. At the same time, the normalization of capillary blood flow was optimal in animals of subgroup 3 in group II, with the microcirculation indicator at the level of 20,59±1,18 perf. units, and its intensity at the level of 2,31±0,12 perf. units by the 14th day. Starting from the 30th day of observation, microcirculation recovery proceeded at the same pace in all groups of animals, with the exception of a slight lag in animals of subgroup 3 in group III, however, by the 90th day and by the end of the observation period, significant differences in capillary blood flow levels could not be found.

Conclusion. The obtained results should be taken into account in outpatient dental practice when performing manipulations related to the use of the GBR technique.

Keywords: autogenic bone, donor zone, guided bone regeneration, microcirculation.

AVEDOVA Diana Yurievna – postgraduate student of the department of Therapeutic Dentistry of the Federal State Budgetary Educational Institution of Higher Education V.I. Razumovsky Saratov State Medical University, Ministry of Health of Russia, sto-kafedra@yandex.ru, ORCID 0009-00090201-1129; **OSIPOVA Yulia Lvovna** – MD, Professor of the Department of Therapeutic Dentistry, V.I. Razumovsky Saratov State Medical University, Ministry of Health of Russia, osipova-sgmu@mail.ru ORCID 0000-0002-0669-2867; **ZYULKINA Larisa Alekseevna** – MD, Head of the Department of Dentistry, Penza State University, Ministry of Education and Science, larisastom@yandex.ru, ORCID 0000-0002-2938-3063; **YURKEVICH Alexander Vladimirovich** – Dean of the Faculty of Dentistry, Head of the Department of Orthopedic Dentistry of the Far Eastern State Medical University of the Ministry of Health of Russia, Doctor of Medical Sciences, Associate Professor, Corresponding Member of the Russian Academy of Natural Sciences. dokdent@mail.ru, orcid.org/0000-0003-1746-5878; **USHNITSKY Innokenty Dmitrievich** – MD, Professor, Head of the Department of Therapeutic, Surgical, Orthopedic Dentistry and Pediatric Dentistry of the Medical Institute of M.K. Ammosov North-Eastern Federal University, incadim@mail.ru, orcid.org/0000-0002-4044-3004

Introduction. Currently, the search for effective methods of reconstructive interventions that contribute to an increase in the height and thickness of the alveolar ridge remains an urgent problem [5, 11, 12, 14, 15]. The need for such dental operations arises when there is insufficient bone level for the installation of implants, or incorrect ratio between the length of the implant and the height of the orthopedic structure, or in case of indications for such interventions in an aesthetically significant area [4, 8, 10, 13]. The predictability and successful outcome of surgical intervention largely depends on the material for augmentation of the alveolar ridges. Autogenic bone in combination with a membrane, not without reason, has the status of the "gold standard" during guided bone regeneration (GBR), however,

the difficulties associated with the trauma of the donor zone force researchers not to stop on the way to solving the issue of obtaining a sufficient volume of implanted bone material [2, 3, 7].

Analysis of the work of domestic and foreign researchers proves that the most appropriate way to reduce the invasiveness of guided bone regeneration (GBR) techniques is to use a combination of autogenic bone with xenogenic bone materials as a bone graft, however, information about the ratio of each of the components of such a combined material in the literature is extremely contradictory and requires more detailed study. The source of autogenic bone can be both intraoral (chin symphysis, mandibular branch, maxillary tubercle) and extraoral donor sites (iliac crest, cranial vault bones, scapula) [1, 6, 9]. However, the results of studies devoted to the comparative evaluation of the effectiveness of the use of autogenous bone from various donor sites are scarce and ambiguous. Taken the above into consideration, we have attempted a comparative assessment of the different ratio of compositions of xenogenous bone material (XBM) and autogenic bone chips (ABC) obtained from anatomically different donor sites.

Objective. Substantiate the effectiveness of using the optimal composition of autogenic bone chips and xenogenic bone material taking into account the anatomical localization of the donor zone in guided bone regeneration (GBR) according to the data of microhemodynamics of the experiment.

Materials and methods of research. The object of research in the work was 84 mature male chinchilla rabbits weighing 2500-3200 grams. During the experiment, we were guided by the recommendations of the ethics Committee established on the basis of the Saratov State Medical University named after V.I. Razumovsky" of the Ministry of Health of Russia (Protocol No. 10 of 11.05.2021). The materials of Cardioplant LLC (Penza) with registration certificates used in the work are xenogenic bone material (XBM) "Xenograft Mineral" and bioresorbable membrane "bioPLATE Barrier". General anesthesia was carried out by intramuscular administration of zoletil 100 (at the rate of 0.1 ml / kg of animal body weight) and xylazine (at the rate of 0.4 ml / kg of animal body weight), propofol was administered to maintain sleep (at a dose of 0.5 ml / kg of animal body weight per hour). Local anesthesia in the oral cavity was performed using a 4% solution of forte ultracaine. The animals formed a defect in the lower jaw area, after which it was filled with osteoplastic material. All animals were divided into three experimental groups: group 1 (n=12 animals) – XBM was used as an osteoplastic material; group 2 (n=36 animals) was divided into three subgroups, depending on the volume ratios of XBM and autogenous bone chips (ABC) obtained from the intraoral donor zone (angle of the lower jaw): subgroup 1 – a composition consisting of a mixture of 25% XBM and 75% ABC was used; subgroup 2 – a composition consisting of a mixture of 50% XBM and 50% ABC was used; subgroup 3 – a composition consisting of a mixture of 75% XBM and 25% ABC was used; group 3 (n=36 animals) was divided into three subgroups, according to the principle similar to the second group: subgroup 1 of group 3 – a composition consisting of a mixture of 25% XBM and 75% ABC was used; 2 subgroup 2 of group 3 – a composition consisting of a mixture of 50% XBM and 50% ABC was used; subgroup 3 of group3 – a composition consisting of a mixture of 75% KKM and 25% ABC was used. At the same time, in the third group, the source of ABC was the extraoral donor zone – the iliac bone. Laser Doppler flowmetry (LDF) was used to monitor the state of microhemodynamics of gum tissues in the area of surgery using a laser analyzer of capillary blood flow "LAKK-02", (NPP "Lazma", Moscow). The integral characteristic of capillary blood flow (indicator M), the characteristic of erythrocyte flow, reflecting statistically significant fluctuations in the velocity of erythrocytes (σ), as well as the ratio between tissue perfusion and the magnitude of its variability (K) were recorded. The results were presented in the form of databases, which were subsequently subjected to statistical processing using the application packages "Statistica V.10" and "Microsoft Excel for Windows" (2007).

Results and discussion. During the study, it was found that the initial values of the microcirculation index (M) in experimental animals of the first (control) group were 17.15 ± 0.13 perf.units, its intensity (σ) was 1.94 ± 0.09 perf. units, the coefficient of variation (Kv) was 11.33 ± 0.54%. On the 3rd day after surgery, a significant increase in capillary blood flow was noted, which was confirmed by a significantly significant increase in comparison with the initial values of the microcirculation index (M) by 76.03%, the values of the mean square deviation by 98.87%, and an increase in the coefficient of variation (Kv) by 11.03% was also marked. On the 14th day after surgery, there was a tendency to tissue blood flow normalization. Compared with the previous observation period, the microcirculation index (M) decreased by 19.31% and amounted to 24.36±1.24 perf. units. The intensity of blood flow (σ) in the study area decreased by 24.21%, vasomotor vascular activity (Kv) decreased by 5.72% and amounted to 11.86 ± 0.72%. On the 30th day, there was also a tendency to restoring the studied parameters. Thus, the blood flow level (M) was at the level of 19.64 ± 0.04 perf. units, the average square deviation (σ) was 2.33±0.06 perf. units, the coefficient of variation (Kv) was 11.87 ± 0.30%. On the 90th and 180th days of observations, microcirculation parameters were noted that did not have statistically significant differences from the values obtained before the experiment. Thus, by the end of the observation period, the microcirculation index (M) was 17.11 ± 0.17 perf. units, the intensity of blood flow was 1.85 ± 0.03 perf. units, the coefficient of variation was 10.79± 0.31%.

It should be noted that before the operation, microhemodynamic parameters in all subgroups of the second group were characterized by similar values. However, three days after the operation, there was a different severity of hemodynamic disorders provoked by surgical trauma. In animals of the first subgroup, the microcirculation index increased from 17.32±1.08 to 29.39±0.64 perf.units, in animals of the second subgroup – from 17.41±0.27 to 30.21±1.11 perf. units, in animals of the third – from 17.32± 0.54 to 27.41±0.84 11 perf. units. It should be noted that normalization of the studied parameters began to be noted by the 14th day of postoperative observations, while the slowest rates of restoration of the functional state of the microcirculatory bed were detected in the first subgroup of this group.

On the 3rd day after surgery, an increase in the values of microhemodynamic parameters due to the reaction to surgery was noted in all subgroups of the third group. Thus, the microcirculation index in the 1st subgroup increased by 52.91%, in the 2nd subgroup – by 58.96%, in the 3rd subgroup – by 61.59%. There was also a sharp increase in the intensity of blood flow, which is confirmed by an increase in the values of the mean square deviation in the first subgroup by 70.81%, in the 2nd subgroup – by 64.95%, in the 3rd subgroup – by 72.50%. In addition, there was an increase in vasomotor vascular activity in all subgroups. On the 14th and 30th days after surgery, all indicators of capillary blood flow showed the dynamics of recovery and by the 90th day of observations returned to their orig-

inal values, remaining stable for the entire period of the study.

The study of hemomicrocirculation parameters according to LDF data at the stages of the experimental study revealed different dynamics of restoration of capillary blood flow in the area of surgical intervention in experimental animals. So, before the surgical intervention, the blood flow level (M) in the groups varied from 17.15 ±0.13 to 17.41±0.27 perf. units, the intensity of blood flow (σ) was in the range from 1.85±0.08 to 2.14±0.09 perf. units, vasomotor activity of microvessels (Kv) ranged from 10.63±0.48% to 12.33±0.55%. It should be noted that there were no significant differences in these indicators before the start of the experiment (p0.05). On the 3rd day after the intervention, statistically significant changes in microcirculation parameters were observed in all the studied groups of animals compared with the values obtained in the groups before the experiment. Thus, a significant increase in tissue blood flow was observed in all animals, which was expressed by a statistically significant increase in the integral indicator of microcirculation (M) and the indicator of blood flow intensity (σ). There was also an increase in the mechanisms of modulation of tissue blood flow, which was manifested by a tendency to increase the values of the coefficient of variation (Cv). At this stage of observations, it was possible to establish an important trend in the dynamics of changes in the studied indicators. Thus, it was noted that a more pronounced reaction of the microcirculatory bed to traumatic intervention was noted in groups of animals implanted with XBM and XBM in combination with ACS from the nutrient donor zone. However, in our opinion, the reason for such a pronounced reaction to intervention in these groups has a different origin. It can be assumed that the use of XBM as an osteoplastic material leads to a more pronounced tissue reaction due to the increased immunological load caused by the use of xenogenic material. In the case of combined use of XBM and ABC, in all likelihood, there is a decrease in the immunological response of tissues to the bioimplant, however, the reaction of microvessels increases as a result of additional traumatization of the donor zone located in anatomical proximity to the operated area.

The volume of the intraoral donor zone also, in our view, affects the nature and severity of the microvascular reaction to the intervention, which was confirmed by the dynamics of the level of capillary blood flow and its intensity in experimental animals of group 2. Thus, on the 3rd day after surgery, there was a tendency to lowering values of the microcirculation index (M) in subgroup 3 of animals with an implanted mixture of XBM (75%) and ABC (25%) from an intraoral source (27.41±0.84 perf. units) compared with similar indicators in the subgroups with an implanted mixture of XBM (25%) and ABC (75%) (the value of M was 29.39±0.64 perf. units), and the subgroup with an implanted mixture of XBM (50%) and ABC (50%) (30.21±1.11 perf. units) of the same inside the blood flow zone. The tendency to increase the intensity of tissue blood flow (σ) in study group 2 was also lower in subgroup 3 of animals with an implanted mixture of XBM (75%) and ABC (25%) from an intraoral source. On the 14th day after the operation, the stabilization of capillary blood flow was noted, which was manifested by a decrease in the studied indicators in all observation groups. However, the normalization of the functioning of microvessels was not the same in the study groups. It should be noted that normalization of capillary blood flow was at an optimal rate in animals of subgroup 3 of group 2, in which by the 14th day the microcirculation index was determined at the level of 20.59 ± 1.18 perf. units, and its intensity was at the level of 2.31 ± 0.12 perf. units. Starting from the 30th day of observation, the restoration of microcirculation proceeded at the same pace in all groups of animals, with the exception of a slight lag in subgroup 3 of group 3, however, by the 90th day and by the end of the observation period, it was not possible to detect significant differences in the levels of capillary blood flow.

Conclusion. The study of the parameters of hemocirculation according to LDF data at the stages of the experimental study revealed different dynamics of restoration of capillary blood flow in the area of surgical intervention. Monitoring of the functional state of the microcirculatory bed suggested that the restoration of capillary blood flow in the intervention area depends on a number of factors. Firstly, the use of xenogenic bone material as a monomaterial in osteoplasty is accompanied by a more pronounced reaction of the microcirculatory bed to surgery compared with the use of mixtures of XBM and ABC. Secondly, the anatomical proximity of the donor zone when using intraoral sources of autostasis enhances the reaction of the microcirculatory bed. A comparative analysis of the dynamics of capillary blood flow in experimental animals allowed to establish that in the first two weeks after the intervention, the optimal rates of restoration of microcirculation in the surgical area are characteristic of osteoplasty using a mixture of XBM (75%) and ABC (25%) from the intraoral donor zone. The data obtained coincided with the results of a histological study of the processes of neosteogenesis conducted during the experiment. The conclusions drawn from the results of the work should be taken into account in outpatient dental practice when carrying out manipulations related to the use of the GBR technique.

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I.N. Usmanova, I.A. Lakman, A.I. Lebedeva, O.A. Guryevskaya, T.V. Viktorova, I.D. Ushnitsky, V.O. Senina, D.I. Usmanova, G.I. Safina

ASSESSMENT OF THE EFFECT OF LOCAL TREATMENT ON THE FREQUENCY OF CELLS WITH NUCLEAR ABNORMALITIES IN THE CYTOGRAM OF BUCCAL EPITHELIUM IN PATIENTS WITH AN EROSIVE AND ULCERATIVE FORM OF LICHEN PLANUS OF THE ORAL MUCOSA (PART 1)

USMANOVA Irina Nikolaevna – MD, Professor, Department of Therapeutic Dentistry with a course of IDPP FGBOU VO BSMU of the Ministry of Health of Russia, Ufa, irinausma@mail.ru, SPIN - 1978-9470, ORCID:0000-0002-1781-029; **LAKMAN Irina Aleksandrovna** – Candidate of Technical Sciences, Associate Professor, Department of Biomedical Engineering, Head of the Scientific Laboratory for the Study of Social and Economic Problems, Ufa University of Science and Technology, Lackmania@mail.ru SPIN - 4521-9097, ORCID:0000-0001-9876-9202; **LEBEDEVA Anna Ivanovna** – Doctor of Biology, Senior Researcher, Acting Head of the Research Department of Morphology of the Ministry of Health of the Russian Federation, All-Russian Center for Eye and Plastic Surgery of the Ministry of Health of the Russian Federation, jeol02@mail.ru, SPIN - 3707-3712, ORCID: 0000-0002-9170-2600; **GURYEVSKAYA Olga Anatolyevna** – postgraduate student of the Department of Therapeutic Dentistry, Ministry of Healthcare of Russia, Ufa, drguryevskaya@inbox.ru, SPIN - 5562-7134, ORCID:0000-0003-4580-9826; **VIKTOROVA Tatiana Viktorovna** – MD, Professor, Head of the Department of Biology, BSMU of the Ministry of Health RF, Senior Researcher of All-Russian Center for Eye and Plastic Surgery of the Ministry of Health of the Russian Federation, t_vict@mail.ruORCID 0000-0001-8900-2480; **USHNITSKY Innokentiy Dmitrievich** – MD, Professor, Head of the Department of Therapeutic, Surgical, Orthopaedic Dentistry and Childhood Dentistry of the Medical Institute of M.K.Ammosov North-Eastern Federal University, Yakutsk, incadim@mail.ru, SPIN 9424-3807 ORCID 0000-0002-4044-3004; **SENINA Valeriia Olegovna** – postgraduate student of the Department of Therapeutic Dentistry, assistant of the department of surgical dentistry, Federal State Budgetary Educational Institution of Higher Professional Education, BSMU, Ministry of Healthcare of Russia, Ufa, era.senina2012@yandex.ru SPIN - 7669-5320, ORCID:0000-0002-5593-085X; **USMANOVA Diana Irekovna** – second year student of the Pediatrics faculty BSMU of the Ministry of Health of Russia, Ufa, dianausmanova00@mail.ru, SPIN-code: 5268-9990,ORCID: 0009-0004-2387-3258; **SAFINA Guzel Irshatovna** – second year student of pediatrics faculty BSMU of the Ministry of Health of Russia, 3guzel.safin2017@yandex.ru, ORCID:0009-0007-3065-0708

Oral Lichen Planus (OLP) is a common chronic inflammatory disease with a high risk of malignization. Early diagnostic tests of erosive and ulcerative form (ECF) of the LP, timely pharmacotherapy are the key to success in the treatment of this form of dermatosis. The cytologic research method is one of the methods by means of which it is possible to obtain the results and adjust the scheme of medication symptomatic treatment in the future. **The aim of research** is to determine the effect of local treatment on the frequency of cells with nuclear abnormalities in the cytogram of buccal epithelium obtained from the reticular mesh area and from the surface of erosions in patients with the erosive and ulcerative form of the Lichen Planus in the oral cavity mucosa lining. **Materials and methods.** In the cytogram of buccal epithelium, cytogenetic indicators (micronucleus, tongue-type protrusion, and broken egg-type protrusion), indicators of nucleus destruction (karyopyknosis, karyorrhexis, karyolysis), and indicators of nuclear proliferation (notching) were assessed. **Results.** The developed method of local treatment of the erosive and ulcerative form of the Lichen Planus contributed to a more significant decrease in the frequency of cells with nuclear proliferation in the form of notches, compared to the group of patients treated according to clinical recommendations ($p=0.05$), and significantly decreased the frequency of cells with micronuclei ($p<0.01$), the frequency of degenerative change of the nucleus at $p<0.05$. Both methods of local treatment were effective, however, in clinical subgroups of patients with high titers of Candida spp. detected in the oral microbiota, the effect of local treatment in the form of ozone therapy, contributed to a decrease in the frequency of the cytogenetic indicator in the form of micronucleus protrusion (at $p<0.1$), nucleus notching (at $p<0.01$), the indicator of completion of nuclear destruction ($p<0.1$). Cytologic examination of the buccal epithelium is a non-invasive method that provides clear information about the status of the epithelial cells, in particular their DNA damage, the proliferative potential of basal cells and cell death, which are considered basic principles of cancer alertness.

Keywords: erosive and ulcerative form of Lichen Planus, buccal cytogram, ozone therapy, hyaluronic acid, corticosteroids, hyaluronic acid gel, Ora-Aid self-adhesive patch.

Introduction. The Lichen Planus (LP) involving the oral cavity mucosa lining (OCML) is a T-cell-mediated chronic inflammatory disease, with characteristic periods of relapses and remissions, and occurs as one of six variants. The reticular and erosive types of the LP are the most common in the OCML [14]. The etiological factors of the disease have not yet been discovered, although it is known that it is based on an autoimmune mechanism [20, 22].

Causes may include bad habits, somatic pathology [19, 24], menopause, depression and stress [10, 22]. The lesions are most often prevalent in females, the location on the OCML is symmetrical, and the buccal mucosa is involved in 28.1% of cases [18].

When diagnosing pathologic processes on the oral cavity mucosa lining in the form of white and/or erosive and ulcerative elements, it is necessary to screen for cancer alertness. Due to the similarity of clinical manifestations, it is sometimes difficult to distinguish benign white lesions from their pre-malignant or malignant analogues [1, 17], and the risk