

In order to take samples for histological examination, animals were subjected into intravenous anesthesia. Samples have been taken 7, 14, 21 days and 1,2 months later. Earlier damaged bone of mandible was sawn for samples. It was a piece of bone with 4 sm of width, 2 sm length from line of cut to each side. This hollowness has been filled with active materials of "biossetal" [O.P.Chudakov, A.M.Grehukha, A.Z.Barmutskaya et al, 2002]. They have put stiches in a wound slit by slit. After the experiment has been finished, samples have been put into the Sol. Formalini 10%. Decalcinated by HNO₃, they have been placed into alcohol and put into paraffin finally. Misroscopic sections have been painted according to the methods of Van-Guison and put into balm. Histological preparations have been made for latest examination in details and studying with light microscope.

Conclusion

Described above methods of making of experimental models to study processes of bone tissue regeneration of mandible are different from old ones. It allows to keep animals alive, there maxillofacial system stays in normal conditions. In some times these animals could be used for new experiments.

.....

APPLICATION OF THE NEW BONE-REPLACING MATERIAL "KAFAM" IN STOMATOLOGY

T.M. ULYANOVA , L.V. ТИТОВА*, S.V.v MEDICHENKO ,
O.P. CHUDAKOV **, L.G. BYKADOROVA**, V.L. EVTUKHOV**,
T.B. LYUDCHIK **

*INSTITUTE OF GENERAL AND INORGANIC CHEMISTRY OF NAS OF BELARUS, MINSK, E-MAIL: ULYA@IGIC.BAS-NET.BY

**BELARUSIAN STATE MEDICAL UNIVERSITY, 83 DZERZHINSKY AVE., MINSK, BELARUS

[Engineering of Biomaterials, 37, (2004), 12-13]

Treatment of the patients suffering from chronic periapical destructive processes, chronic complex periodontitis, benign formations of the maxillae and other diseases of facial bones is the important and urgent problem of maxillofacial surgery since the above-mentioned diseases are very often encountered in the practice of physician-dentists. According to the WHO data obtained from examining the population of 53 countries the prevalence of periodontitis diseases attains 98% [1]. Among the grown-up population of the Republic of Belarus is practically the

100% morbidity of gingivitis, simple and complex periodontitises [2, 3]. The results of the last two decades are evident of the fact that chronic apical periodontitises are 30% and benign tumors and cysts are no less than 45% of the total number of surgical maxilla diseases. In the majority of cases the immediate and distant results on the treatment of patients with such affections remain unsatisfactory [4]. At the same time in the USA, Germany, Great Britain, Switzerland, Japan and in other countries new osteoplastic materials are actively used for treating the above dis-

eases. These materials promote recovering bone tissue, enable one to stop destructing the tooth root and to stimulate the processes of purposeful regeneration and reconstruction of the tissues of living organism. Calcium phosphate materials [5] are used in modern maxillofacial surgery. In Russia bone defects are filled with home-produced synthetic hydroxyapatite-based materials: "Ostim-100", "Gapkol", "Kolapol", "Kollapan", etc. [6].

In the Republic of Belarus the co-workers at the Institute of General and Inorganic Chemistry of the NAS of Belarus and at the Maxillofacial Surgery Chair of the Belarusian State Medical University are also carrying out investigations on creating osteoplastic materials. Unlike the Russian identical materials, Belarusian porous ceramics "Kafam" is stable in shape. When mixed with the blood in the operative wound, it makes a porous structure needed for a further purposeful growth of the cells of the newly formed bone tissue.

The chemical composition and structure of the developed material are adequate to those of the mineral part of the human bone. The calcium-to-phosphorus ratio is within 1.67-1.70 and corresponds to the one in the human native bone. This material can be sterilized many times, not losing its properties and can be used in combination with different-type antibiotics and antiseptics. The application of "Kafam" in medical practice does not require special instrumentation and equipment. It is produced in different shapes (blocks, plates, granules from 0.1 to 1.2 mm) in four types A, B, C and D that differ by heat treatment temperature and strength. All-type materials are used for surgical treatment of different stomatological diseases [7]. This material underwent technical, sanitary-hygienic, biomedical and clinical tests. Its use in stomatological practice was supported by the permission of the Ministry of Health of Belarus IM. 7. 3743 of March 20, 2003.

In planning the surgical intervention it is necessary to choose a required shape of "Kafam" - blocks, plates or granules. The size and shape of the implant material are chosen individually for every patient depending on the size and the shape of the bone defect. To illustrate the application of the material "Kafam" in stomatological surgery, two methods are presented below.

Procedures of filling the operative bone defects after radicular cysts are removed (Fig. 1). Prior to the operation the calcium phosphate ceramics "Kafam" undergoes sterilization together with operative instruments. A patient is tested on the sensitivity to a used antibiotic. The radicular cyst is removed using the traditional surgical methods. The formed bone defect is instilled with an aqueous 0.05% chlorhexidine solution and then with a 30% dichloride lyncomicine solution (FIG. 1a). The defect cavity is loosely filled with "Kafam" granules (type A, 0.5-0.6 mm in size) with a surgical spoon (FIG.1b). Having been instilled with the blood the granules form a blood clot with the material introduced (FIG. 1c). A mucoperiosteal graft is returned to its place and is fixed with separate interrupted sutures (FIG. 1d). Sutures are removed after 6-7 days. A patient is then under dynamic observation.

Procedures of treating periodontitis (FIG. 2). After the granulation tissue and tooth deposits are removed, the tooth roots are polished and also the alveolar bone border and the inner surface of the mucoperiosteal graft are treated. The wound is treated with an aqueous 0.05% chlorhexidine solution. If a patient is very sensitive to antibiotics, then the instillation with a 30% dichloride lyncomicine solution is not made. After the operative wound has been visually examined and the sizes of the marginal periodontium defect have been determined, the "Kafam" plate (type C) of the corre-

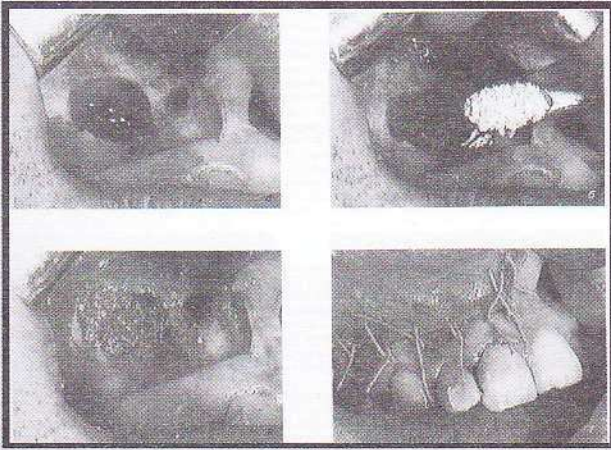


FIG. 1. The filling of bone defects after the radicular cyst removal.

sponding shape and size and "Kafam" granules (type B, 0.2-0.3 or 0.3-0.5 mm in size) are chosen. The plate is introduced into the periodontal pocket. Slightly pressing it the defect is filled. As the plate can be loosely adjacent to the walls of the bone defects, granules are additionally introduced into the pocket. The mucoperiosteal graft is returned to its place and is sutured. Then the protective gum dressing is placed.

Sutures are removed after 7-8 days.

During the postoperative period the patients with the

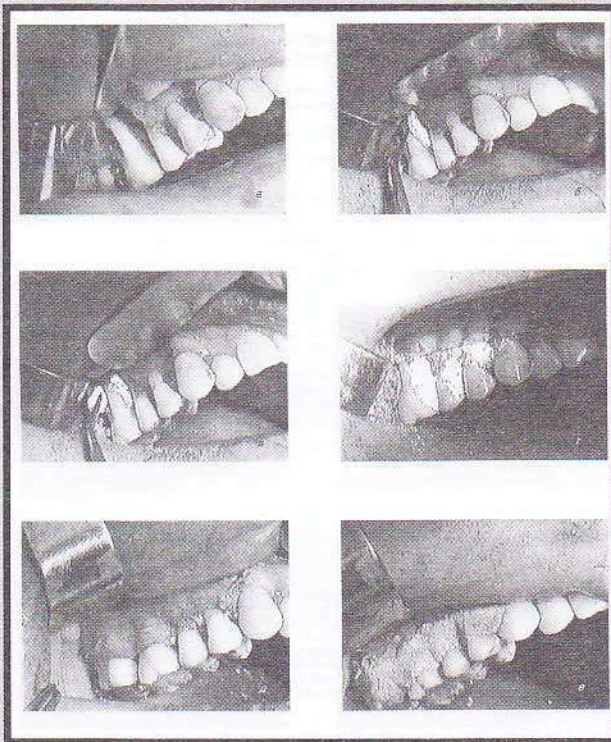


FIG. 2. Gingivoplastics using the material "Kafam".

bone defects filled with "Kafam" were subjected to X-ray examinations. Small operative defects that are formed after the cyst removal were filled with a young bone regenerate irrespective of the used material type and the granule size in 2-3 months. As for the patients with medium and large postoperative bone defects, the decrease in bone defect sizes was seen in 3 months. In this case, the regen-

eration process was more clearly observed at its periphery. After 6 month the mature bone tissue was found using X-rays at the places of small and medium defects. As for the patients with large postoperative bone defects the complete regeneration of the mature bone tissue was observed after 1 year.

As for the patients operated upon chronic complex periodontitis, in 3 months after treatment the stable remission was seen, the haemophilia stopped, the tooth mobility diminished, and the depth of periodontal pockets decreased to 3 mm. The X-ray examination revealed the formation of new bone structures, the osteoporosis reduction and the improvement of the sharpness of bone contours. In total, more than 200 operations were made using the material "Kafam".

The positive immediate and distant results on the surgical treatment of benign formations of maxillae and also of chronic complex periodontitis, when postoperative bone defects are filled with calcium phosphate ceramics "Kafam", permit one to recommend this material for use in everyday stomatological practice.

References

- [1] The Modern Aspects of Clinical Parodontology. Ed. by L.A. Dmitrieva. MedPress, Moscow 2001.
- [2] Artyushkevich A.S., Trofimova E.K., Latysheva S.V. Clinical Periodontology. Uradzhai, Minsk 2002.
- [3] Lutskaya I.K., Demjanenko E.A. Modern Stomatology, 2003, 2, 36-38.
- [4] Bezrukov V.M., Grigorjants L.A., Rabukhina E.A., Badalyan V.A. Ambulatory Operative Dentistry: Manual for Physicians. Medical Information Agency Press, Moscow 2002.
- [5] Grudyanov A.I., Erokhin A.I., Byakova S.F. The New in Stomatology, 2001, 8, 73-77.
- [6] Litvinov S.D., Bulanov S.I. Stomatology, 2001, 3, 7-12.
- [7] Ulyanova T.M., Titova L.V., Medichenko S.V. et al. Modern Stomatology, 2003, 1, 38-42.