LOWER JAW ENDO PROSTHETICS WITH HYDROXYAPATITE AND COLLAGEN

Abstract: The use of materials corresponding to the composition and structure of human bone is seen today as the most promising direction in reconstructive surgery. The biocompatibility of the implanted material is correlated with this composition. Modification of the endoprosthesis surface by means of bioactive coating is considered to be one of the promising directions for the creation of complex materials, possessing not only the properties of the passive matrix for the newly formed bone, but also certain strength characteristics.

The aim of the research is to increase efficiency of surgical treatment of mandibular bone defects using combined osteoplastic material based on hydroxyapatite and collagen.

Material and methods of research: The study was based on the analysis of treatment results of 75 patients with mandibular defects who were treated in hospital. There were 42 (56%) male and 33 (44%) female patients among the operated patients. The age of the patients ranged from 25 to 58 years.

In the first group of patients (32 cases), a CONMET LLC titanium implant was placed during reconstruction. In patients of the second group (23 patients) hydroxyapatite powder was applied on the surface of the implant by laser sintering according to the method. In the third group of patients (20 patients), in addition to laser sintering of hydroxyapatite, collagen (Healos J&J) was applied on the implant surface by CONMET LLC.

Results of the research and discussion: All patients were evaluated for cellular and humoral immunity. The cellular component of immunity, which is responsible for transplantation immunity, is of great importance in implantation. Investigating the T-cell component of immunity, the number of T-lymphocytes, T-suppressors, T-helpers and immunoregulatory index of Tx/Tc ratio were calculated.

Preoperative analysis of the immunoregulatory subpopulations of T-lymphocytes revealed a slightly reduced content of T-helpers and T-suppressors compared to healthy controls, but the difference was not significant (P<0.05). Studies of B-lymphocyte functional activity by serum levels of immunoglobulins G, A and M before the operation showed no significant differences from the healthy subjects. Analysis of group data also showed no significant difference in preoperative IgG, IgA and IgM levels. Mean preoperative immunoglobulin levels as well as individual immunoglobulin levels did not differ significantly from the control group. X-ray examination 6 months after surgery showed homogeneous tissue in the area of the defect in the first and second groups of patients, while a trabecular structure was present in the third studied group.

All patients were X-rayed postoperatively and after 1, 3, 6 and 12 months. X-ray densitometry was used to determine bone mineral density by determining the surface bone mineral
density. According to the WHO recommendations (1994), a T-criterion of -1.0 - 1.4 g/cm² was considered normal. The maximum positive dynamics of the index was observed in the group III after 12 months at the bone-implant interface - 0,98±0,4* (p<0,01).

The implant with bio-coating is covered by dense bone tissue, micro-movements and tensions at the bone-implant interface are prevented. As proceeding from the above-mentioned we can conclude that application of hydroxyapatite to the titanium implant surface by the laser sintering method assists to optimize the restoration of the structural and functional characteristics of the bone.

Conclusions: Thus, it seems possible to conclude that the use of endoprostheses with a layer of hydroxyapatite, leads to faster formation and maturation of bone tissue, which allows to recommend its use in clinical practice.