

# OPTIMIZATION OF SURGICAL TREATMENT IN DENTAL IMPLANTATION IN DIFFICULT ANATOMICAL CONDITIONS WITH RECONSTRUCTIVE INTERVENTIONS

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## INTRODUCTION

Dental implantation in dental surgery makes up from 8 to 36% of all types of treatment, and among cases requiring inpatient treatment — 10–57% [1]. The modern approach to the use of implantation in difficult anatomical conditions includes the implementation of measures aimed at creating optimal conditions associated with the restoration of bone tissue. In spite of the fact that today dental implantation is the most effective and high-tech method of prosthetics for lost or completely missing teeth in the shortest possible time and with maximum comfort for patients. Issues concerning the period of implantation, problems of rejection, determination of not only clinical, but also morphological criteria for signs of implantability of implants, as well as the possibilities of re-implantation after rejection of the implanted structure, are still not fully resolved. The appearance among the surgical methods of the methods of preparing the mouth for prosthetics and implantation has greatly reduced the severity of the problem with the fixation of the prostheses on the edentulous jaws. Results of surgical treatment for partial or complete anodontia are not always satisfactory. In some patients, due to the lack of load, the alveolar processes of the jaws atrophy, which makes implant placement impossible [8]. A number of researchers, in order to improve the fixation of prostheses, offer various ways to increase the alveolar part of the jaws: alveolar plastic with auto-bone, allogeneic, xenogenic and artificial materials. The initial volume suitable for successful implantation is achieved with the help of various types of bone plastics, which are selected subjectively, without relying on objective, pathogenetically substantiated criteria, as which you can use the state of the structures of local immune homeostasis

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in the implantation zone. A significant proportion of patients with surgical treatment and dental implantation should be carried out pathogenetically justified, taking into account the morphological indicators of readiness of the oral mucosa for surgical treatment. This will significantly reduce the time of treatment, hospital stay, improve the results of treatment, prevention of complications of dental implantation [3]. Implantation causes a state of secondary immunodeficiency, determined primarily at the organism level. Despite the fact that studies have been conducted that prove the impaired function of cellular and humoral immunity during implantation [9], at the present stage there are only a few studies on local factors of immune protection. Not only prevention of the development of purulent-necrotic tissue changes, but also the processes of epithelialization, angiogenesis, and the formation of intimate connections of the implant with the surrounding tissues depend on the activity of immunocompetent cells. These cells are regulators of regeneration processes [2]. However, studies on the comparative characteristics of the local immune status in implant placement are practically absent, and the available work has been performed mainly in experiments on animals [5, 7]. There are practically no data on the possibility of dental implantation and long-term results in patients with myeloma, with osteoporosis, on the background of oncological diseases, with endocrine pathology, as well as after extensive injuries of the facial skull. Therefore, the study of the activity and state of the ensembles of immunocompetent cells in the area of dental implantation is relevant and is among the main key problems of dentistry.

## OBJECTIVE

To study the patterns of changes in the immune homeostasis of the oral mucosa in the dynamics of dental implantation in patients of different age groups under normal and pathological conditions in order to increase the effectiveness of treatment and prevention of complications.

## METHODS

The material was obtained from patients of dental hospitals that were observed during the preparatory reorganization of the oral mucosa, during bone reconstructive measures before the implants were installed and during the implants installation with the subsequent observation of reparative regeneration processes. The study was carried out taking into account the provisions of the Helsinki Declaration (2013) and with the permission of the Ethics Committee of the Far Eastern Federal University. The material was obtained in accordance with the nomenclature of clinical laboratory studies of the Ministry of Health of the Russian Federation (Order No. 64 of February 21, 2000). Clinical material for the study was obtained on the basis of the FEFU medical center (Vladivostok) during 2012–2017. The study included patients diagnosed with myeloma, cancer, injuries of the maxillofacial area, ectodermal dysplasia. The patients underwent reconstructive operations with taking tissue fragments to be disposed of for this study. After surgery, patients continued to receive glucocorticoids to prevent further relapses. The study took into account the age of patients, gender, anatomical topography of damage to the facial part of the skull. The analysis of the material was carried out using classical morphological and immunohistochemical methods with the identification of diabetes positive cells of various differentiation. The material was embedded in paraffin or frozen in a cryostat for the preparation of sections. Filling in paraffin was carried out according to the classical method. The localization of CD4, CD8, CD34, CD68, CD163, CD203a, p53, p63 of the company DAKO for the illustration and subsequent comparative analysis of the dynamics of their number in different periods of dental implantation was detected. For labeling CD163, clone 10 D6, a class of immunoglobulins igG1, was used. Unmasking of antigenic determinants was carried out in a glass container filled with a regenerating solution and creating the conditions of a water bath for 1 hour. Part of the preparations was treated with microwave radiation, which gives the best unmasking effect, within half an hour. A 10 mmol/l citrate buffer, pH 6.0 or DAKO TRS (Target retrieval solution, code No. S 1700) was used for the unmasking of antigens. The cooled preparations were washed in distilled water. Antibodies were used at a dilution of 1:50 and 1:100. The brown color indicated a positive reaction.

## RESULTS

The value of indicators of the content of effector immunocytes in the clinical and morphological reaction was proved when implantation was used in dental patients in normal conditions and with comorbidities.

The role of immunocompetent effector cells of the oral mucosa as an important prognostic criterion for the success of dental implantation is shown for the first time. Algorithms for choosing the terms of dental implantation are developed and proposed, which allow to exclude the occurrence of clinical manifestations of implant rejection, substantiating the prognostic efficiency of the use of dental implantation and prognosis in various states of local immune mucosal homeostasis in different age groups in normal conditions and with comorbidities. A tightly attached keratinized mucosa around endosseous dental implants is believed to be protective against peri-implant bone loss. According to Kaufmann R, Bassetti R, Mericske-Stern R, Enkling N. (2014). tension caused by buccal frena and mobile non keratinized mucosa is to avoid. This case report documents the optimization of peri-implant mucosal conditions in the upper and lower jaw. At the time of second stage surgery (re-entry) at submucosally osseointegrated dental implants an enlargement of keratinized mucosa and a thickening of soft tissue was obtained administrating a vestibuloplasty combined by a free gingival graft or a vestibuloplasty combined by an apically moved flap [4]. The clinical efficacy of using the developed algorithms when choosing the terms of implantation after the surgical treatment of dental patients on the basis of a survey of the state of the local immune homeostasis of the oral mucosa has been proven. For the first time, a medical tactics for the management of dental patients has been proposed, which allows preventing and eliminating the occurrence of clinical manifestations of complications of dental implantation against the background of various pathologies, taking into account the plasticity of the epithelial barriers of the oral mucosa. Materials of the thesis were the basis for the development of additions to the algorithms of examination of dental patients on the background of osteoporosis, multiple myeloma, oncological and endocrine pathology in need of dental implantation, which actually contributed to the improvement of the quality of surgical care and the efficiency of dentists and maxillofacial surgeons. Recommendations were developed for optimal and effective dental implantation in patients of different age groups, introduced into practical healthcare in the work of public and private dental clinics of Primorsky Krai and the city of Vladivostok. Despite the success of implantation, cases of rejection, the presence of patients with relative and absolute contraindications and risks when installing implants, the terms of using implants dictate not to stop there, but to improve the methods of surgical intervention, develop cellular technologies and strategies to improve osseointegration and reparative regeneration the development of implant coatings

using nanotechnology and osteoinductor coatings, as well as the search for overshennyh materials for replacement in autologous transplantation [6].

## DISCUSSION

The existing framework of diagnostic measures does not fully meet the clinical needs of modern dentistry, since they give a conditional assessment of the processes occurring during osteointegration and osteosynthesis [2]. For the development of personal medical approaches and ideas about the processes occurring during reparative regeneration in the area of implant installation, an extension of the diagnostic resource is required. This will allow not only to predict the success and outcomes of implantation, but also to develop new strategies at the cellular and molecular levels [5]. To create all the conditions for normal reparative regeneration, in an optimal time sequence and with a certain spatial distribution of cells and signaling molecules involved in this particular healing process, it is necessary to have clear ideas about the mechanisms of reparative regeneration of periodontal structures [3].

With significant violations of tissue regeneration, the development of local distortions of local or systemic processes of cell regeneration, restriction of blood supply due to systemic shifts and major defects that occur, the use of implantable materials, membranes or biological agents is limited, and ideally their use should be accompanied by careful selection to promote the predictable and sufficient quantity and quality of regenerated tissue. According to P.A. Shajahan et al. (2018), the ability to quickly treat adentia becomes a real need [5]. The study of tissue reaction to the implant in the zone of reconstruction of the damaged periodontal and lost bone is the main area in which molecular mediators should be used and investigated [2]. Infectious antigens that produce biofilm microorganisms are one of the main causes of failed dental implants. It should be borne in mind that the survival of dental implants is an individual process [4]. The timing of osseointegration depends on the area in which the implantation was performed, as well as on the quality of the bone tissue [9]. In general, the implantation of dental implants lasts from three months in the lower jaw to six months in the upper [5]. The understanding of complex mechanical bone behavior and size-dependent properties ranging from a nano- to a macroscopic level are essential in the biomechanical optimization of implants. Shibata Y, Tanimoto Y, Maruyama N, Nagakura M. (2015) The requirements of regenerated tissue at the interface include high strength, fracture toughness related to ductility, and time-dependent energy dissipation and/

or elastic-plastic stress distribution. Moreover, a strong relationship between strain signals and peri-implant tissue turnover could be expected, so that ideal implant biomechanics may enable longevity via adaptive bone remodeling [5].

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