



STRUCTURE OF SINGLE-STAGE DENTAL IMPLANTS FOR VARYING DEGREES OF ALVEOLAR ATROPHY

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Article history:	Abstract:
Received: March 11 th 2022 Accepted: April 20 th 2022 Published: May 30 th 2022	Lack of teeth impairs the vital function of the body - chewing of food, which affects digestive processes and causes the development of other diseases. The state of teeth, periodontium and mucous membrane of the oral cavity is connected with the state of other parts of the gastrointestinal tract, as well as other systems of the body (locomotor system, cardiovascular system, endocrine system), higher nervous activity, infectious diseases, cancer, quality of sleep, obesity and the state of general defence forces. Peri-implantitis and one of the reasons for its appearance may be the connection between implant and abutment and cavities in it. This problem can be minimised but not eliminated in demountable implants, and the penetration of micro-organisms into the internal spaces of the implants seems inevitable.

Keywords: radiography, odontometry, height of bone

INTRODUCTION.

Oral health is regarded by scientists as a useful marker of general health and healthy ageing. In the absence of teeth the structural, functional and aesthetic equilibrium of the maxillofacial region and many systems of the body is disturbed, leading to social consequences and a decrease in the quality of human life. Implantology today is one of the most dynamically developing areas of modern dentistry, the use of modern technology has allowed a new approach to the treatment of missing and partially missing teeth. Defective teeth should be restored in the shortest possible time and in the most functional way, and here the dental implantation and prosthetics is the most modern way to save the stability of the masticatory and oral system, in the spectrum of high-tech treatment methods, it justifiably takes priority. According to researches of leading analytical agencies in Europe and USA, the demand for dental implants is expected to exceed the demand for all other kinds of dental treatment. And the market for dental implants and bone grafting materials is the fastest growing segment in dental technology analytics.

According to the world's leading analytical agencies, prices in the implant market are steadily decreasing and this trend is not expected to change yet, which contributes to the spread of this treatment method. Due to the trend of steadily ageing population in the developed world and the accumulation of unmet needs for dental restoration, a large number of companies see an opportunity to develop these promising and sophisticated dental care methods. The market for dental implants and bone grafting materials is the fastest growing segment in dental technology and we are constantly being offered new products.

PURPOSE OF THE STUDY:

Structure of single-stage dental implants for varying degrees of alveolar atrophy

MATERIALS AND METHODS:

Patients were divided into three groups depending on the degree of atrophy and the types of dental implants and surgical treatment protocols used. The first group consisted of patients in whom a single-stage surgical protocol of dental implantation and non-disintegrated (monolithic) dental implants were used. These patients had dental defects of varying lengths and sufficient bone volume. There were 20 patients in this group. The second group consisted of patients with dentition defects in whom a one-stage surgical protocol of dental implantation and non-dismountable (monolithic) dental implants were used; these patients had various degrees of atrophy of



the maxillary ridges. The group included 20 patients. This group included a subgroup of 5 patients in whom we used our proposed minimally invasive method of placement of the dental implant and our patented new design of the dental implant. **Materials and methods:** The patients were divided into 3 groups depending on the degree of atrophy and the types of dental implants and surgical treatment protocols used. The first group consisted of patients in whom a single-stage surgical protocol of dental implantation and non-disintegrated (monolithic) dental implants were used. These patients had dental defects of varying lengths and sufficient bone volume. There were 20 patients in this group. The second group consisted of patients with dental defects in whom a one-stage surgical protocol of dental implantation and one-piece dental implants were used. In these patients, different degrees of maxillary atrophy were observed. The group included 20 patients.

This group included a subgroup of 5 patients in whom we used our proposed minimally invasive method of placement of the dental implant and our patented new design of the dental implant. These dental implants were collapsible, but we placed them using a single-stage surgical protocol, simultaneously with gingiva shapers and/or abutments and modern crowns. The third (control) group consisted of patients with dental defects in whom the traditional two-stage surgical protocol of dental implant surgery and collapsible dental implants were used. These patients had dental defects of varying lengths and varying degrees of atrophy of the maxillary alveolar bone. There were also 20 patients in this group. In total, 103 dental implants were placed in these 60 patients aged from 18 to 59 years: 24 in position of lower jaw premolars; 16 in position of upper jaw premolars; 27 in position of lower jaw molars; 16 in position of upper jaw molars; 12 in position of upper jaw frontal teeth group; 8 in position of lower jaw frontal teeth group. During the dental implant surgery, we used a surgical physiodispenser, surgical handpiece and original surgical implant system kits. We proposed a minimally traumatic one-stage dental implant surgery. This technique was used in an additional subgroup of 5 patients.

At the third stage of the study, a comparative analysis of the effectiveness of treatment of patients using different surgical techniques of dental implantation was carried out. We carried out a comprehensive study of 103 dental implants installed in the previous stage of the study. We performed the study in the same 60 patients operated on earlier with application of different methods of dental implantation for comparative estimation of treatment results with

application of different methods of surgical protocol of implant treatment with application of monolithic and collapsible dental implants in patients with defects of dental rows and different volumes of dental tissue. Out of 274 dental implants placed according to the one-stage protocol, 179 (65, 33%) were placed, out of them, 160 were monolithic (indestructible), which was 89, 38% of the number of the implants placed in a single-stage manner. Using the two-stage technique, in cases of bone grafting operation in case of significant atrophy of the alveolar ridges and more multi-stage techniques, 95 dental implants (34, 67%) were placed, all of them being demountable. Thus, non-dismountable (monolithic, single-stage) dental implants accounted for 58.40% and demountable implants accounted for 41.60% of the total number of implants placed (Table 10). It should be noted that the non-dismountable (monolithic) dental implants demonstrated a lower survival rate compared to the demountable implants placed according to the two-step protocol (92.94% and 95.86%, respectively), however, these differences were not statistically significant ($p > 0.05$). Of particular importance is the fact that approximately half of the lost implants were loose single-support prosthesis retainers for anchoring removable dentures in bone of insufficient volume and quality. A comparison of the one-stage and two-stage surgical protocols for dental implants also showed no statistically significant differences in implant survival rates and were as follows: 93.6% for the one-stage and 95.1% for the two-stage surgical protocols. The final survival rate of the placed and analysed dental implants was 94.16% in the retrospective group of patients. Although survival rates differed between the groups, overall, a comparable survival rate was demonstrated for both dental implant designs (92.94% and 95.86%) and no statistically significant differences were detected between the one-stage and two-stage implant protocols. In turn, the results of the survival studies of non-dismountable (monolithic) implants used to support fixed prostheses show their superiority over fixed demountable implants over the period from 2018 to 2022. This can be explained by the more frequent use of temporaries in the placement protocol and functional ligation (splinting) of non-dismountable dental implants, which leads to improved survival due to a more even distribution of functional loads.

Examining the long-term results of dental implantation in patients up to 10 years after the surgery, 93,6% of one-stage implants retained their ability to function (their clinical consistency corresponded to 3-5 according to the five-point scale). The main cause of disintegration was



Developed inflammation around the implant (peri-implantitis), possibly due to inappropriate prosthetics and/or improper distribution of the masticatory load. It is worth mentioning that very rarely, implant mobility was also observed without symptoms of inflammation, which can be attributed to non-axial osseointegration, i.e., fibrointegration. The condition of the jawbone was assessed mainly by means of the orthopantomograms available at the time of surgery, which unfortunately did not always provide complete and reliable information on the bone structure and density. Complications developed when the available anatomical conditions were optimistically overestimated, contraindications were not identified at the preoperative stage or the masticatory loads during prosthetics were unevenly distributed, due to lack of experience and insufficiently thorough examination of the patient. When assessing patient satisfaction with the treatment performed, the following was revealed: the highest satisfaction was observed in patients with fixed prosthesis designs, with implants placed according to a single-stage surgical protocol showing a slightly higher satisfaction score compared to two-stage placed collapsible dental implants (mean score 4.40 versus 4.14 on a five-point scale). However, no statistically significant differences were found between the surgical protocols and types of prosthesis designs ($p > 0.05$).

When assessing patient satisfaction with the treatment performed, the following was revealed: the highest satisfaction was observed in patients with fixed prosthesis constructions, with implants placed according to the one-stage surgical protocol showing a slightly higher satisfaction score compared to the two-stage placement of collapsible dental implants (mean score 4.40 versus 4.14 on a five-point scale). In this regard, we can conclude that shortening the treatment period, abandoning multistage and osteoplastic surgery during the surgical phase of treatment by using a single-stage surgical protocol of dental implantation and non-disassembled dental implants leads to increased patient satisfaction with the treatment performed without significant differences or with advantages in the clinical consistency of the installed dental implants and prosthetic structures.

The algorithm for choosing the optimal implant design and surgical technique of their installation in patients with maxillary atrophy has not been sufficiently developed so far; therefore, patients' satisfaction with the treatment performed is often insufficient. Examination and the results of the patient survey showed that in patients with sufficient bone volume of the maxillary ridges (atrophy type A, B) the

clinical consistency of dental implants installed using the one-stage surgical protocol does not

CONCLUSIONS:

Thus, the results obtained allow us to state the comparable results of the clinical evaluation of the dental implants placed according to the one-stage and two-stage surgical protocol in patients with sufficient bone volume in the alveolar processes of the jaw and increase the patients' satisfaction with the treatment performed while reducing its duration, in case of using the one-stage surgical protocol. The obtained data show that the degree of atrophy of the maxillary ridges has no significant impact on the clinical suitability of the placed dental implants.

Retrospective studies have shown that single non-removable dental implants (end and inlay prostheses and removable denture retainers) are most at risk of failure (mobility). The long-term results of implantation show that patients with varying degrees of alveolar atrophy have a favourable outcome in 94,15-100% of cases if the correct technique of implant placement, immediate non-functional splinting prosthetics and adequate postoperative medication therapy are observed.

The obtained retrospective data makes it possible to consider a one-stage surgical protocol of dental implant surgery and non-dismantled implants as an objective self-sufficient method of the data obtained in retrospect allow us to consider the one-stage surgical protocol for dental implants as an objective, self-sufficient method.

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