Original Research

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Dental implants installation method with palatal exposure (vestibular bone shield) in several teeth absence in included and terminal defects with lateral atrophy of maxilla alveolar process

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Abstract

INTRODUCTION. Nowadays, we can see rapid development of world dental implantation, where there are various methods for repairing dental defects on artificial supports. Despite this, the problems of dental implantation in severe lateral atrophies of the alveolar process of the upper jaw remain unresolved. In this regard, there are researches aims at improving the surgical stage in complex clinical cases associated with a lack of bone tissue of the alveolar process of the upper jaw. Taking into account the above, we chose the topic of this research.

AIM. Purpose of the research is to increase efficiency of surgical and orthopedic stages of rehabilitation in the absence of several teeth in the form of included and terminal defects with lateral atrophy of the maxilla alveolar process by applying the developed method.

MATERIALS AND METHODS. The article presents the clinical results of the developed dental implantation method with palatal exposure (vestibular bone shield) in the absence of several teeth in included and terminal defects with lateral atrophy of the maxilla alveolar process (patent application No. 2025128342 dated 16.10.2025). A five-year analysis of the clinical effectiveness of the developed method in 136 clinical cases in patients in the age group from 41 to 69 years old was carried out. The obtained results were evaluated in MS Office Excel using standard methods.

RESULTS. The combination of the main features of the developed method contributes to a pronounced minimization of the invasiveness of interventions and a shorter rehabilitation period, which determine the safety and clinical effectiveness of the proposed method. As part of the developed method, the recommended dental implants with a milled and anodized neck provide optimal mucogingival consolidation from the exposed palatal side. This tactic excludes bone augmentation, including the use of bone substitutes and traumatic interventions to reduce the alveolar crest.

CONCLUSIONS. The clinical results of practical application of the developed dental implantation method with palatal exposure (vestibular bone shield) in the absence of several teeth in included and terminal defects with lateral atrophy of maxilla alveolar process characterize its efficiency due to low traumatism, pronounced reduction of duration of surgical and orthopedic treatment.

Keywords: dental implantation, implants with milled and anodized neck, lateral atrophy of alveolar process, included and terminal defects, maxilla, mucogingival integration

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Метод установки дентальных имплантатов с палатинальным доступом (вестибулярным костным щитом) при отсутствии нескольких зубов в включенных и концевых дефектах на фоне латеральной атрофии альвеолярного отростка верхней челюсти

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Резюме

ВВЕДЕНИЕ. В настоящее время наблюдается интенсивное развитие мировой дентальной имплантации, где представлены различные методы восстановления зубных дефектов на искусственных опорах. Несмотря на это, проблема дентальной имплантации при выраженной латеральной атрофии альвеолярного отростка верхней челюсти остается нерешенной. В связи с этим ведутся исследования,

направленные на улучшение хирургического этапа в сложных клинических случаях, связанных с дефицитом костной ткани альвеолярного отростка верхней челюсти. Учитывая изложенное, нами была выбрана тема настоящего исследования.
ЦЕЛЬ ИССЛЕДОВАНИЯ. Повышение эффективности хирургического и ортопедического этапов реабилитации при отсутствии нескольких зубов в виде включенных и концевых дефектов на фоне латеральной атрофии альвеолярного отростка верхней челюсти за счет применения разработанного метода.
МАТЕРИАЛЫ И МЕТОДЫ. В статье представлены клинические результаты разработанного метода дентальной имплантации с палатинальным доступом (вестибулярный костный щит) при отсутствии нескольких зубов во включенных и концевых дефектах на фоне латеральной атрофии альвеолярного отростка верхней челюсти (заявка на патент № 2025128342 от 16.10.2025). Проведен пятилетний анализ клинической эффективности разработанного метода в 136 клинических случаях у пациентов в возрасте от 41 до 69 лет. Полученные результаты оценены в MS Office Excel с применением стандартных методов.
РЕЗУЛЬТАТЫ. Совокупность основных особенностей разработанного метода способствует выраженной минимизации инвазивности вмешательств и сокращению реабилитационного периода, что определяет безопасность и клиническую эффективность предлагаемого решения. В рамках метода рекомендуемые дентальные имплантаты с фрезерованной и анодированной шейкой обеспечивают оптимальную мукогингивальную консолидацию с обнаженной палатинальной стороны. Такая тактика исключает необходимость костной аугментации, включая применение костнопластических материалов и травматичных вмешательств по снижению альвеолярного гребня.
ЗАКЛЮЧЕНИЕ. Клинические результаты практического применения разработанного метода дентальной имплантации с палатинальным доступом (вестибулярный костный щит) при отсутствии нескольких зубов во включенных и концевых дефектах на фоне латеральной атрофии альвеолярного отростка верхней челюсти подтверждают его эффективность, обусловленную низкой травматичностью и выраженным сокращением сроков хирургического и ортопедического лечения.

Ключевые слова: дентальная имплантация, имплантаты с фрезерованной и анодированной шейкой, латеральная атрофия альвеолярного отростка, включенные и концевые дефекты, верхняя челюсть, мукогингивальная интеграция

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Для цитирования: Ушницкий И.Д., Семенов А.Д., Иванов А.В., Унусян О.С. Метод установки дентальных имплантатов с палатинальным доступом (вестибулярным костным щитом) при отсутствии нескольких зубов в включенных и концевых дефектах на фоне латеральной атрофии альвеолярного отростка верхней челюсти. *Эндодонтия Today.* 2025;23(4):649–656. https://doi.org/10.36377/ET-0142

INTRODUCTION

Today, studies show the prevalence of major dental diseases in the population, which are a determining factor in dental defects frequency [1–3]. Moreover, dental implantation is often carried out to restore them, which has some features in lateral atrophy of maxilla alveolar process [4]. For this purpose, various surgical methods are used in practical dentistry, which have certain positive properties and some disadvantages [5; 6]. So, well-known methods of treatment affect the duration of rehabilitation measures, since they require bone augmentation with the likelihood of possible complications, which generally causes some inconvenience for the patient [7].

It is important to emphasize that specialists need the appropriate competencies for the optimal choice of a tactical approach, leading to the efficiency increase of dental care and the quality of life of patients to achieve positive results in surgical and orthopedic rehabilitation of patients with the absence of several teeth in included and terminal defects with lateral atrophy of the maxilla alveolar process [8]. Meanwhile, the resources provide insufficient information on the installation of dental implants with palatal exposure when compared with classical methods for restoring dentitions [9].

Currently, dental implantation is developing quite intensively to improve the quality of medical care provided and the availability of restoration of dental defects on artificial supports. However, the problems of dental implantation with moderate and pronounced lateral bone loss of the maxilla alveolar process remain unresolved [5; 10]. Taking into account the above, studies aimed at optimizing the surgical stage in complex clinical cases associated with the absence of several teeth in included and terminal defects with lateral atrophy of the alveolar process of the upper jaw, which determined the direction of the presented study.

AIM

Purpose of the research is to increase efficiency of surgical and orthopedic stages of rehabilitation in the absence of several teeth in the form of included and terminal defects with lateral atrophy of the maxilla alveolar process by applying the developed method.

MATERIALS AND METHODS

The article presents the clinical results of using the developed method of dental implantation with palatal exposure (vestibular bone shield) in the absence of several teeth in included and terminal defects with lateral atrophy of the alveolar process of the upper jaw (patent application No. 2025128342 dated 16.10.2025). A five-year analysis of the clinical efficacy of the developed method in 136 clinical cases in patients in the age group from 41 to 69 years old (the main group) was carried out.

At the same time, a control group was formed for comparative assessment, which included 24 patients aged 40–65 years old, where dental implants were installed using the intraosseous dental implantation method with simultaneous restoration of the lost bone volume [11].

The criteria for inclusion in the study group were patients' partial secondary adentia on the upper jaw in the area of several teeth in the form of included and terminal defects. Exclusion criteria included refusal to participate in studies, general somatic diseases of a severe form, allergy to local anesthetics and cancer.

According to the proposed method, dental implantation with palatal exposure (vestibular bone shield) was performed using implants with a milled and anodized neck after infiltration anesthesia with 4% ultracaine forte 1.8 ml with epinephrine 1 : 100,000. After that, a scalpel incision was made along the crest with vestibular displacement, where the mucoperiosteal flap was peeled off with a raspator in order to provide surgical access and visualization. A 3D printed navigation surgical template was then captured. Using a physiodispenser, navigation set of surgical cutters on a corner tip with abundant irrigation with cooled saline at a speed of 800 revolutions/min, implant beds were formed according to a standard drilling protocol. Further, dental implants were installed, where the turns in the coronal part were left not covered with bone tissue from the palatal surface, and the vestibular bone remained as a shield. After that, height selection, installation of multi-units and healing caps were carried out. If necessary, a circular reduction of the cortical bone was carried out around the multi-unit (profiling) for their passive landing. After the manipulations, the mucoperiosteal flap was sutured at the exits of the multi-units. When reaching the specified torc of 35–45 n/cm, the provisions were fixed.

The clinical trial was approved by the local ethics committee at the North-Eastern Federal University (protocol No. 40 dated 18.09.2022). Patients who participated signed informed consent.

Statistical evaluation of the obtained results was carried out using Excel and Statistica 10 programs, where the average value (M) and its errors (m) were detected from the studied parameters.

RESULTS

The method for dental implants installation with a palatal exposure (vestibular bone shield) in the absence of several teeth in included and terminal defects with lateral atrophy of maxilla alveolar process is used for rehabilitation of patients by installing dental implants with a milled and anodized neck. Significant result of this method application is the increase of efficiency of implantation and further prosthetics, time reduction of complex (surgical and orthopedic) treatment and minimisation of injuries during operation due to installation of dental implants with milled and anodised neck into maxilla alveolar process with incision of turns from palate side and creation of vestibular bone shield in the area of absence of several teeth in the form of included and end defects of dental rows of upper jaw.

The practical implementation of the developed method begins with analyzing the area of absence of several teeth with an included defect of the dentition on the upper jaw (Fig. 1), as well as with determining the thickness and height of the alveolar process. Planning was carried out using specialized digital programs, based on the 3D cone-beam computed tomogram data, where, in accordance with the obtained results, implants were selected by diameter and height. The locations of the two implants were then determined. At the same time, orthopedist, implant surgeon and dental technician simulated a surgical template and printed it on a 3D printer with a special resin for templates. After infiltration anesthesia, the jaw area was skeletonized with partial secondary adentia and lateral atrophy of the upper jaw (Fig. 2). Then, using a surgical navigation kit (Fig. 3) and changing the sequence of cutters, the bed for implants was formed according to

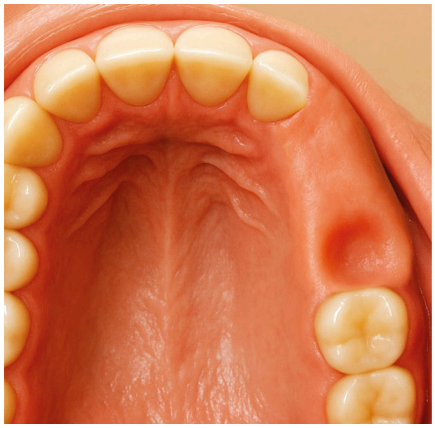

Fig. 1. Maxillary appearance with multiple teeth missing, included dentition defect on the left

Рис. 1. Внешний вид верхней челюсти при отсутствии нескольких зубов, включенный зубной дефект слева

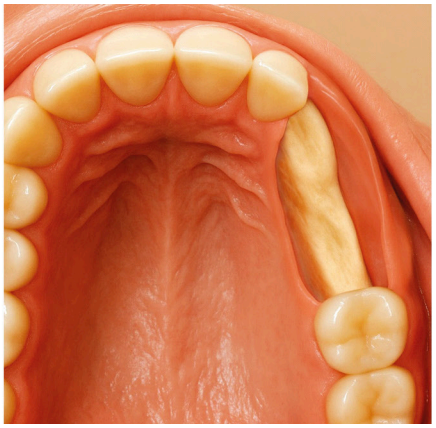

Fig. 2. Skeletonized area with lateral atrophy of the maxillary alveolar bone in areas 2.3, 2.4, 2.5

Рис. 2. Скелетированная область с латеральной атрофией альвеолярной кости верхней челюсти в зонах 2.3, 2.4, 2.5

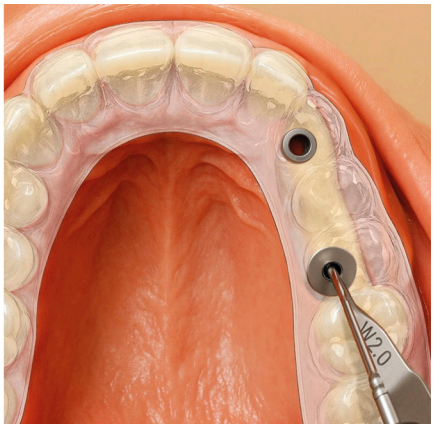

Fig. 3. Superimposed navigational surgical template

Рис. 3. Наложенный навигационный хирургический шаблон

a standard protocol (Fig. 4). Subsequently, dental implants with a milled and anodized neck were inserted into the alveolar process with exposure from the palatal side of the implant turns (Fig. 5). When the specified torus of implants is more than 35 n/cm, during the operation, direct abutments “Multi-unit” were installed, which were twisted with a force of 25 n/cm (Fig. 6), if necessary, a circular reduction of the cortical bone around the suprastructure is performed for its passive fit, after which healing caps were fixed on them, where the wound edges were matched and sutured with interrupted sutures “Monoquik” No. 5. A digital print was taken with an intraoral scanner, sent to a dental laboratory, and ready-made provisioning crowns made of PMMA material were fixed on a Multi-unit with a force of 15 n/cm (Fig. 7). After 3–6 months, permanent orthopedic structures are made.

It should be noted that according to the proposed method, a plug can be placed on implants when clinically necessary, sutured tightly and waiting for osteointegration, followed by the formation of the gingival cuff in 3–4 months. At low density of bone tissue, when there are no indications for immediate load, where the torc on the installed implant is more than 25 n/cm, but less than 35 n/cm, gingival cuff formers or Multi-unit abutments are installed with twisting of healing caps until final integration.

The assessment of clinical efficacy determines that in the main group the period of rehabilitation of patients is reduced by 2 times ($p \leqslant 0.05$), where the rate of successful surgical stage is 97,25$\pm$0,05%, and in the control group 91,35$\pm$0,41% ($p \leqslant 0.05$). Meanwhile, there are certain disadvantages of the method in the control group, which are associated with a long rehabilitation period with duration of 6 to 8 months from the beginning of the surgical stage to orthopedic treatment, where, due to the use of bone substitutes, insulating membranes and invasiveness, early complications are likely to occur.

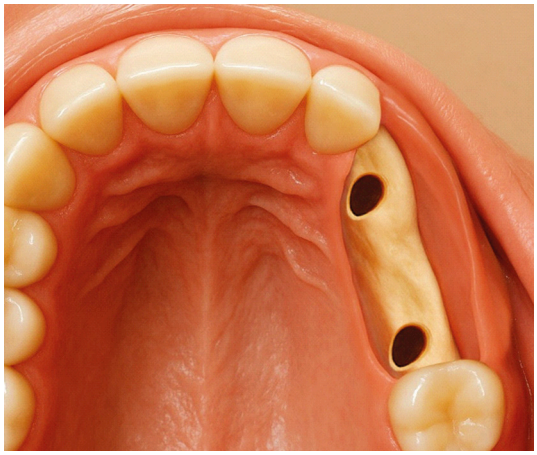

Fig. 4. Formed bone beds for dental implants

Рис. 4. Сформированные костные ложа для дентальных имплантатов

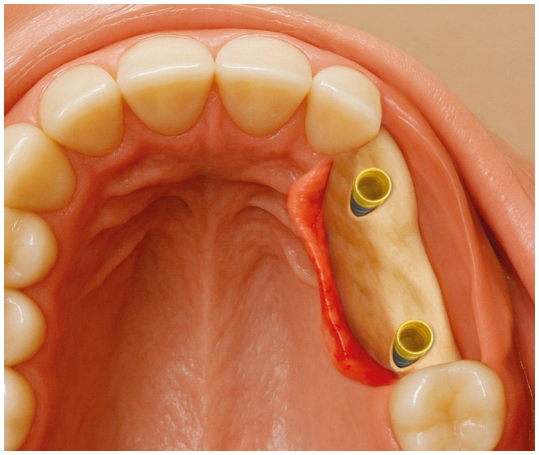

Fig. 5. Installed dental implants with palatal exposure (vestibular bone shield) with milled and anodized neck

Рис. 5. Установленные дентальные имплантаты с палатинальным доступом (вестибулярный костный щит) с фрезерованной и анодированной шейкой

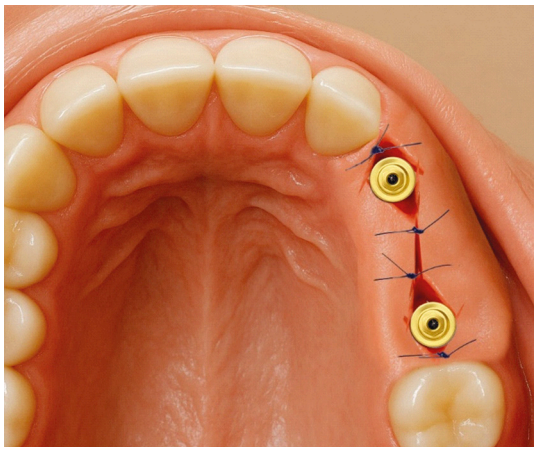

Fig. 6. Implanted multi-unit superstructures and sutured postoperative wound

Рис. 6. Установленные многоблочные супраструктуры и зашитая послеоперационная рана

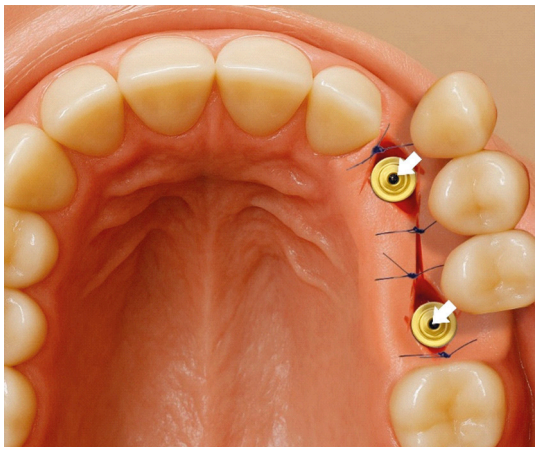

Fig. 7. Installation of a provision orthopedic structure

Рис. 7. Установка временной ортопедической конструкции

Thus, based on the results obtained from the installation of dental implants with palatal exposure (vestibular bone shield) in the absence of several teeth in the form of included and terminal defects with lateral atrophy of the alveolar process of the upper jaw, a number of advantages have been established that are associated with the possibility of using implants of different manufacturers of the desired design with a milled and anodized neck, which determine optimal muco-gingival integration with the exposed part of the implant from the palatal side. In addition, low-trauma is determined by eliminating the need for bone augmentation, including using bone substitutes, sparing skeletonization of the dental defect area, and in most clinical cases, repeated surgical intervention is not required to open implants and install suprastructures. Due to low-invasiveness of method efficiency of post-operation regenerative processes increases, which creates prerequisites for reduction of rehabilitation terms and makes it possible to produce orthopedic structures with simultaneous load.

A CASE

Patient A., born in 1971, 21.09.2024, visited the dental clinic of North-Eastern Federal University with complaints of partial absence of maxillary teeth on the right. Objectively in the oral cavity: partial secondary adentia of the upper jaw on the left in the area of 2.3, 2.4, 2.5, the mucous membrane on the vestibular and palatal sides is pale pink, moderately moistened, moderate lateral atrophy of the alveolar process of the upper jaw is determined. On the cone-ray computed tomogram: the height of the alveolar bone to the maxillary sinus in the area of the teeth 2.3, 2.4, 2.5 is 11.0–13.0 mm, lateral atrophy of the alveolar bone in the area of the crest is 4.2–5.2 mm.

After consultation with an orthopedic dentist, an implant surgeon, and a comprehensive clinical and laboratory examination, it was decided to install two dental implants with "Parallel CC Ti Unite" company "Nobel Biokear" with a palatal exposure (vestibular bone shield) in positions 2.3 and 2.5.

27.09.2024. Surgery was performed to install two dental implants with a palatal exposure (vestibular bone shield) with an anodized neck in positions 2.3 and 2.5.

Surgery course: under local infiltration anesthesia with 4% Ultracaine Forte solution – 1.8 ml 1 : 100,000 with epinephrine of the upper jaw on the left, an incision was made with a scalpel along the crest, the vestibular and palatal mucoperiosteal flap was detached with a raspator to provide general access to the implantation area. The osseous navigation surgical template was fixed. With the help of the NSK Surgic Pro+ physiodispenser on the corner tip at a speed of 800 revolutions/minute, using a navigation kit with abundant irrigation with cooled saline, beds for implants are formed to a given depth. After that, two dental implants with a milled neck were installed in position 2.3 d3.75 L 10.0, torc 35 n/cm; 2.5 d4.3 L 10.0, torc 35 n/cm with palatal exposure (vestibular bone shield). Further, with the help of a physiodispenser, an angular tip and a profiling cutter, a circular reduction of the alveolar crest around the implant was performed at a speed of 350 revolutions per minute with abundant cooling with saline. Then the height was selected, multi-units 2.3 straight multi-unit, torc 25 n/cm and 2.5 straight multi-unit, torc 25 n/cm were installed, healing caps of torc 5 n/cm were installed. From the vestibular side, a free gingival graft was inserted and fixed to restore the contours of the alveolar process. The mucoperiosteal flap at the exit site of the multi-units was sutured with Monokvik 5.0 interrupted sutures. Digital prints were removed for the manufacture of a provisional orthopedic structure.

28.09.2024. The patient came for examination and fixation of the provisional orthopedic structure. Objectively, the general condition was satisfactory, the face configuration was not changed, the regional lymph nodes were not palpable, the mouth opening was full, painless. Oral mucosa without pathological changes. Palpation of the postoperative area is painless, there is no discharge, at the time of examination there are no signs of infection, the sutures are consistent. The healing caps were removed and temporary crowns were fixed.

05.10.2024. The patient presented for examination and removal of sutures. Objectively, the general condition was satisfactory, the face configuration was not changed, the regional lymph nodes were not palpable, the mouth opening was full, painless. Oral mucosa without pathological changes. Palpation of the postoperative area is painless, there is no discharge, at the time of examination there are no signs of infection, the sutures are consistent and partially resorbed. Seams were removed, recommendations were given. The permanent design was made and recorded after 3 months, the condition of the tissues around the implants is stable without signs of inflammation and loss.

DISCUSSION

Currently, various methods of rehabilitation of patients with partial secondary adentia with alveolar atrophy are used in dental implantation. Thus, there is a method of dental implantation used for significant horizontal resorption of alveolar processes, consisting in resection of the crest to a level of sufficient thickness of the alveolar processes [12, pp. 259]. It is performed by incision of mucous membrane and periosteum, detachment of mucoperiosteal flap and exposure of alveolar process crest, grinding of crest to the level, when bone thickness will allow implantation, by means of Lindeman cutter or fissure boron, further preparation of bone bed for implant. The disadvantage of this method is invasiveness, deterioration of aesthetic parameters at the orthopedic stage due to a decrease in the height of the bone and gum, as well as elongation of the clinical crown, which leads to a narrowing of the indications for its use.

In addition, a method of dental implantation is known [13], including detachment of mucoperiosteal flap, implant installation, after implant installation it is packed with alloimplant, covering the alloimplant

with a biomaterial film, closing the wound and after 3–6 months installing the supra-root part of the implant, characterized by the fact that in case of significant atrophy of the bone tissue of the alveolar process and the proximity of the mandibular canal or maxillary sinuses, respectively, a horizontal incision of the mucous membrane is made from the vestibular side slightly below the transitional fold and two vertical incisions are made through the crest of the alveolar process, a mucoperiosteal flap is peeled off and folded back until bone tissue is exposed, a pre-prepared surgical template is fixed, which determines the direction of drilling at the planned location using drills, drills, taps create bone beds, the depth of which by 2 mm does not reach the bottom of the maxillary sinus or the neurovascular bundle of the lower jaw, implants are introduced into bone beds without immersing the intraosseous part of the implant completely into bone tissue, alveolar process surface is decorticated and bone plate is perforated, autoplasma is successively placed on this area, platelet-rich gel, superficially demineralized bone alloimplant in the form of a plate or bone block wherein openings are created with a surgical template, and a membrane for guided bone regeneration from preserved dura mater or amnion or tendon or demineralized bone tissue, saturated with antimicrobials causing inhibition of aerobic and anaerobic microflora growth. The disadvantages of this solution are the complexity of technical design, the need to use bone substitutes and barrier membranes, which may lead to the occurrence of some inflammatory reactions of the body after the interventions. The film of platelet-rich autoblood plasma does not have the necessary mechanical and biological properties and does not last long, therefore, it cannot serve as an obstacle to the penetration of infection.

Meanwhile, there is a method for plasty of a defect with a damaged wall of a tooth socket with a bone autograft taken from the tubercle of the upper jaw, and direct dental implantation, temporary prosthetics [14]. Essence of method lies in the fact that under local anesthesia tooth is removed as less traumatically as possible, curettage is carried out and implant is installed in optimal spatial position, then temporary crown is tried on and optimized. That is followed by making an incision in the middle of the crest of the tubercle to the distal surface of the last molar under local anaesthesia in the donor region (maxillary tubercle), forming a mucoperiosteal flap and visualising the bone crest. Using a bone chisel 2 mm wide, a bone graft is taken and carefully placed in the defect area, thus forming a normal crest contour. The graft is placed 2 mm below the gingival margin. The remaining space between the bone block and the implant is filled with spongy bone chips. Then temporary crown is fixed to implant and wound is closed. The second surgical field left after the graft is taken is sutured tightly. The disadvantage of this method is the recession of the marginal gum and underlying bone tissue, especially in patients with a thin mucosal biotype and no attached keratinized gum. Another disadvantage is the presence of a second surgical field for taking autogenic bone and, as a result, additional injury.

There is a method of two-stage dental implantation. First, using a bone autograft and a directed tissue regeneration method, the required volume of the alveolar process is created, then dental implants are introduced [15]. The first operation included the main and weakening incisions, detachment of the mucoperiosteal flap, sawing a bone block corresponding to the size of the defect, drilling channels for titanium screws fixing the graft, processing and fixing the graft with filling the existing voids with crushed bone from another bone block, wound closure. After 6 months wound is opened, titanium screws are removed and implants are installed, wound is closed again, after another 3 months implants are opened and gum formers are installed for further prosthetics. The disadvantages of the known method are that treatment with a long rehabilitation period (9–18 months and more), since at first the volume of the bone tissue of the alveolar process is restored, then an implantation operation is performed, and only then prosthetics are started, where additional surgical trauma is applied due to the need to take the autograft from the lower jaw, a defect also remains, and subsequently the membrane and fixing screws are removed.

CONCLUSION

The results of our dental implants installation method with palatal exposure (vestibular bone shield) in the absence of several teeth in included and terminal defects with lateral atrophy of the maxilla alveolar process clinically confirmed the effectiveness due to minimally invasive, significantly reducing the time of complex surgical and orthopedic rehabilitation of patients, which to a certain extent characterizes the prospects of its use in clinical dentistry.

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All the authors made equal contributions to the publication preparation in terms of the idea and design of the article; data collection; critical revision of the article in terms of significant intellectual content and final approval of the version of the article for publication.

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