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ОСОБЕННОСТИ РАСЩЕПЛЕНИЯ АЛЬВЕОЛЯРНОГО ГРЕБНЯ ПРИ ОДНОМОМЕНТНОЙ ИМПЛАНТАЦИИ (КЛИНИЧЕСКИЙ СЛУЧАЙ)

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Аннотация

После удаления зуба кости челюсти со временем значительно уменьшаются в объеме (атрофируются). В течение первого года в области удаленного зуба теряется 25% костной ткани, а в последующие 2–3 года костная ткань сокращается на 50% от первоначального объема. После установки имплантатов убыль костной ткани прекращается. Все более широкое применение имплантатов обуславливает и необходимость как новых исследований конструкций имплантатов, материалов, так и технологий использования зубных имплантатов. Изученная нами научная литература показывает, что успех зубных имплантатов во многом зависит от качества и количества доступной кости в реципиентном участке. Однако это может быть нарушено или недоступно из-за заболеваний костной ткани, травмы, заболевания пародонта и т. д., что, в свою очередь, требует дополнительных манипуляций с костью.

Предмет. Профессиональные и психологические возможности врача к эффективной деятельности в ситуации неопределенного исхода хирургической операции.

Актуальность настоящего исследования обусловлена необходимостью профилактики осложнений операции имплантации в профессиональной деятельности врача стоматолога-хирурга в условиях недостаточной толщины альвеолярного отростка.

Цель — изучить установку и сохранение импланта при недостаточной толщине альвеолярного отростка.

Методология. Проведено ретроспективное исследование пациентов с недостаточной толщиной альвеолярного отростка, прошедших имплантационное лечение.

Результаты. Пациенту применили хирургическую тактику при недостаточной толщине альвеолярного отростка; антибактериальную терапию; химическую деконтаминацию и наложение аллогенного трансплантата.

Выводы. Костное расширение с помощью пьезоскальпеля является надежным и относительно безопасным способом расширения узких гребней. Метод расширения костного гребня позволяет получить оптимальную толщину кости для вживления импланта. Расширение атрофических валиков с применением пьезоскальпеля — методика, не требующая забора кости, сокращающая время операции и послеоперационную заболеваемость, что приводит к сокращению сроков реабилитации.

Ключевые слова: ресурсный подход при проведении сложного хирургического вмешательства, пьезохирургия, расщепление альвеолярного гребня, имплантация, недостаточная толщина альвеолярного отростка

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FEATURES OF CLEAVAGE OF THE ALVEOLAR RIDGE DURING SIMULTANEOUS IMPLANTATION (CLINICAL CASE)

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Annotation

The widespread use of dental implants for the restoration of missing teeth has expanded the possibilities of treatment for both patients and dentists. After tooth extraction, the jaw bones decrease significantly in volume over time (atrophy). During the first year, 25% of bone tissue is lost in the area of the removed tooth, and in the next 2–3 years, bone tissue is reduced by 50% of the original volume. After the implants are installed, the loss of bone tissue stops. The increasing use of implants also necessitates both new studies of implant designs, materials, and technologies for the use of dental implants. Such research has increased dramatically over the past two decades and is expected to expand. The scientific literature we have studied shows that the success of dental implants largely depends on the quality and quantity of available bone in the recipient site. However, this may be disrupted or unavailable due to bone diseases, trauma, periodontal disease, etc., which, in turn, requires additional manipulations with the bone.

Subject. Professional and psychological capabilities of a doctor to work effectively in a situation of uncertain outcome of a surgical operation.

The relevance of this study is due to the need to prevent complications of implantation surgery in the professional activity of a dentist-surgeon in conditions of insufficient thickness of the alveolar process. The need for this study was also dictated by the needs of patients using implantological systems in maintaining the quality of life.

The aim is to study the installation and preservation of the implant with insufficient thickness of the alveolar process.

Methodology. A retrospective study of patients with insufficient thickness of the alveolar process who underwent implantation treatment was conducted. Patients were included in the study if they had one or more implants without clinical signs of implant mobility.

Results. The patient was treated with surgical tactics with insufficient thickness of the alveolar process; antibacterial therapy; chemical decontamination and the imposition of an allogeneic graft.

Conclusions. Bone expansion using a piezoscalpel is a reliable and relatively safe way to expand narrow ridges. The method of expansion of the bone ridge allows to obtain the optimal thickness of the bone for implantation of the implant. The expansion of atrophic rollers with the use of piezoscalpel is a technique that does not require bone collection, reducing the time of surgery and postoperative morbidity, which leads to a reduction in the duration of rehabilitation.

Keywords: resource approach during complex surgical intervention, piezosurgery, splitting of the alveolar ridge, implantation, insufficient thickness of the alveolar process

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Introduction

Dental implantation becomes a routine procedure for the restoration of dentition defects. But secondary adentia is not always accompanied by the preservation of the alveolar process of the necessary size for implantation. A fairly frequent limitation when planning dental implantation operations in the lateral parts of the lower jaw is the insufficient thickness of the alveolar process, where the height remains normal. A thickness not exceeding 2–4 mm actually excludes the installation of mini-implants without prior osteoplasty. Most often, the loss of bone tissue of the alveolar process is associated, according to our observations, with the usual method of tooth extraction without the use of osteoplastic materials. Quite often, according to literary sources, the narrowing of the alveolar process is associated with orthodontic treatment, as a result of which the bone stretches and loses its width [12, 13].

There are several classifications of atrophy of the alveolar process of the jaws [14]. Specialist doctors assess the degree of atrophy of the bone tissue of the jaws after tooth extraction due to dental implantation in various ways, some researchers offer their own classification [15]. In our work, we adhere to the classification of defects of the alveolar ridge proposed by Lekholm and Zarb, which allows us to establish a connection between the choice of surgical technique, the quality of bone tissue and the shape of the jaw. The proposed classification makes it possible to determine not only the position and number of implants to be installed, but also the need for additional surgical manipulations on the alveolar process to optimize the position of the implants.

To expand the alveolar process, the method of autotransplantation of bone blocks in the form of tabs or overlays or other methods that allow increasing the volume of the alveolar process by the method of directed regeneration is often used [16].

The expansion of the alveolar process can be performed using osteotomes, a special set of tools designed to form or shape the bone in preparation for the installation of dental implants, which increases the width for the installation of implants and allows for the immediate installation of implants in narrow protrusions during the expansion [17].

The method we use involves increasing the width of the alveolar process by splitting it, which does not require additional extraction of the donor bone, the material used is placed inside the spongy bone layer, and is not attached to the cortical layer, which significantly improves the restructuring and replacement of the material with bone.

For a successful choice of surgical treatment, it is necessary not only to have the skills and abilities of a specialist, but also to form a stable interaction between the doctor's personality and the environment, adequate self-esteem, stable motivation to provide high-quality dental care, responsibility for their actions [18]. High-

tech dental care assumes that a dentist — surgeon must be confident in the effectiveness of the proposed method of treatment and convey confidence to the patient, including by non-verbal means [19–23].

Materials and methods of research

The predictable result of surgical interventions also depends on the psychophysiological state of the patient, which must be taken into account when forming the trajectory of dental treatment. Diagnosis, treatment planning, careful surgical treatment, postoperative follow-up and appropriate load on the implant are all important factors for achieving the success of surgical treatment [24].

The groups of patients we examined at the Blanco Dental Implantation Center were formed by randomization (random distribution) and were homogeneous in characteristics. A study of 75 patients who applied for implantation treatment in the surgical department in the period from 2018, including a questionnaire, clinical examination, X-ray examination, was conducted. Based on the multilevel system of providing dental care to the population proposed by us earlier, an individual plan of work with the patient has been developed [25]. During this period, a dental examination of 75 patients was carried out, including the width of the alveolar process.

The predictable result of surgical interventions also depends on the psychophysiological state of the patient, which must be taken into account when forming the trajectory of dental treatment. Diagnosis, treatment planning, careful surgical treatment, postoperative follow-up and appropriate load on the implant are all important factors for achieving the success of surgical treatment [25].

Out of 75 people — 34 (45.9%) men and 41 (54.1%) women. The age group ranged from 26 to 67 years, the average age of patients was 46.50 ± 3.01 years. Of these, 32 (42.6%) had local post-traumatic defects as a result of tooth extraction, 15 (20%) had severe atrophy of the alveolar bone. Concomitant diseases were detected in 46 (65.3%) people. Among them, chronic diseases of the gastrointestinal tract prevailed without exacerbation — 29 (63%) patients, hypertension — 14 (30.4%) patients, compensated type 2 diabetes mellitus was observed in 3 (6.6%) people.

The extent of defects within the dentition varied from 2 teeth to 22 teeth, which corresponds to the complete loss of teeth in both jaws (the average length of the defect is 8.3 ± 1.18 teeth). The included defects of the dentition were detected in 27 (36%) patients, of which defects were found in 13 (17.3%) people on the upper jaw, in 14 (18.66%) examined on the lower jaw.

Terminal defects of dentition were detected in 48 (67%) patients, of which 8 (10.6%) people had defects in the upper jaw, 12 (16.1%) patients had defects in the lower jaw, and 28 (37.3%) examined patients had defects in both jaws.

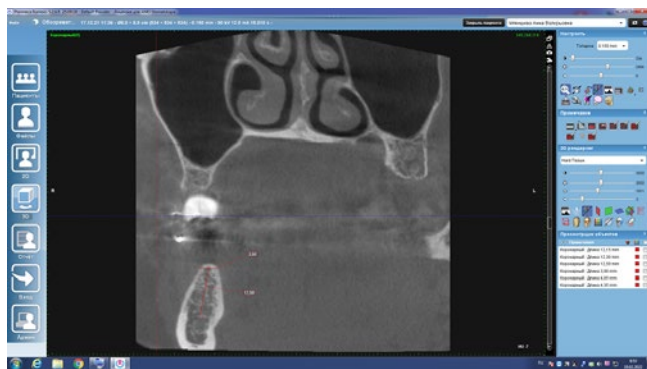


Fig. 1. Calculation of CT before surgery

Рис. 1. Расчет КТ перед оперативным вмешательством



Fig. 2. An implant with a hybrid thread

Рис. 2. Имплант с гибридной резьбой

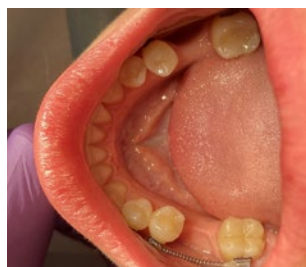


Fig. 3. Clinical picture (before surgery)

Рис. 3. Клиническая картина (перед операцией)



Fig. 4. Alveolar ridge before surgery

Рис. 4. Альвеолярный гребень перед оперативным вмешательством

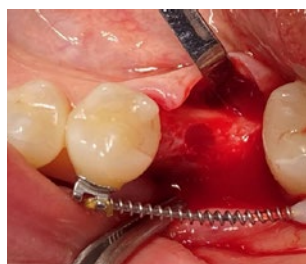


Fig. 5. Preparation of the implant bed

Рис. 5. Подготовка ложа имплантата

During the dental examination, 8 (10.6%) cases of “insufficient thickness of the alveolar process” were revealed in patients (the term is taken from foreign colleagues). By insufficient thickness we mean the width of 2–4 mm of the alveolar ridge.

Let's consider one of our clinical cases

Patient K. applied with included defects of the lower jaw — absence of teeth 3.6, 4.6. A dental examination, a study of the CBCT was carried out. Lateral atrophy of the alveolar ridge was revealed in the area of previously removed teeth 46, 36. In the projection of the tooth 4.6, the width of the tip of the alveolar part of the lower jaw is 3.9 mm, to the lower lunular nerve 12.5 mm. In the area of the missing tooth 3.6, the width of the tip of the alveolar ridge is 2.7 mm, to the lower lunular nerve 14.5 mm.

It was decided to perform bilateral cleavage of the alveolar ridge with the immediate installation of implantswiss bone level implants. This line of implants has the advantage of a hybrid thread, with a beveled neck, which allows you not to exert excessive compression on the bone, and to guarantee a stable excellent result, and there is also a special milling cutter in the kit, which does not injure narrow alveolar ridges at the second step to a wider milling cutter. The selected implants allow you to work in any area, in particular on the lower jaw in the projection of the sixth teeth. This type of implants copes with the chewing load, and the neck of these implants is devoid of a deep thread, which gives it additional strength and makes it safer.

Based on the clinical picture, we proposed using implants with a diameter of 4.3 and a length of 10 mm, which, in our opinion, is the ideal size for this clinical situation.

In the area of the tooth, the width of the alveolar ridge is 4.6, which allows you to first prepare the bed for the implant installation, and then split it. The course of the operation is carried out with standard access, but without vertical incisions, to prevent flap nutrition disorders and reduce the risk of suture failure. Also, when splitting the alveolar process, the movable lateral wall of the alveolar ridge does not injure the vertical incision with sharp edges, which significantly reduces the risk of complications.

We prepare the implant bed 2 mm deeper than the size we have chosen — 12 mm long. This is due to the protocol of the operation — the bonelevel implant should be placed with a depth of 1.5–2 mm and using the last cutter for the size already, which is intended for the final formation of the bed for implants with a diameter of 3.7 (marked in green), we perform a surgical protocol. When splitting, a narrower stroke is always formed than for a standard implant installation, because the expansion of the alveolar ridge occurs due to the pressure exerted by the walls of the implant on the walls of the alveolar ridge from the inside.

We create conditions for splitting the alveolar ridge, using a piezoscalpel, allowing the lateral wall of the alveolar ridge to gain mobility. We carry out one deep longitudinal horizontal cut along the alveolar part of the lower jaw in the projection of the missing tooth 46, then two vertical cuts from the buccal side reaching the lingual cortical plate, but not violating its integrity. We form an additional access, only up to the spongy bone tissue or even before reaching it, 7 mm below the tip of the ridge that connects the vertical saw. This additional filing is mainly carried out only when the ridge on the lower jaw is split, because it has a denser structure with a more pronounced cortical bone. The upper jaw is often split without additional filing. Even if the upper part of the side wall has thinned too much during the preparation of the bed, or has been lost altogether, this will not prevent the implant from being installed with the necessary depth, because when moving it rises by 1–2 mm, thereby compensating for the degree of loss.

After the cleavage is formed, we proceed to the installation of the implant. It is very important to do this without pressure and try not to give him directions, as this can lead to a complete break of the wall. When the implant is installed, a split occurs. After the plug is fixed in the implant, the cleft, in the case of a width of more than 2 mm, is filled with a bone graft. In our case, an allograft was used. And stitches are applied — a mattress seam. We do not use the membrane during splits, as it can disrupt the nutrition of the side wall. When splitting the bone, it is necessary to evaluate the elasticity of the muco-periosteal flap. During the operation, periodically return them to their original place and see if you can sew up the wound without any significant strain on the tissues.



Fig. 6. Cleavage formation before implant placement

Рис. 6. Формирование расцепа перед установкой имплантата

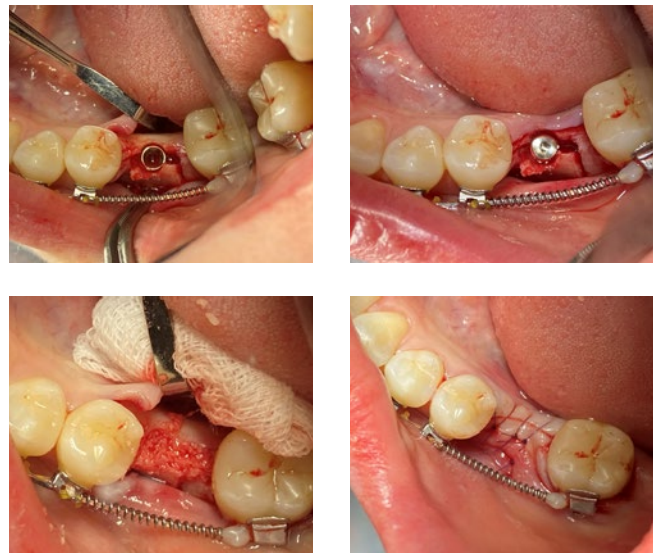


Fig. 7. Stages of the implant placement operation

Рис. 7. Этапы проведения операции установки имплантата

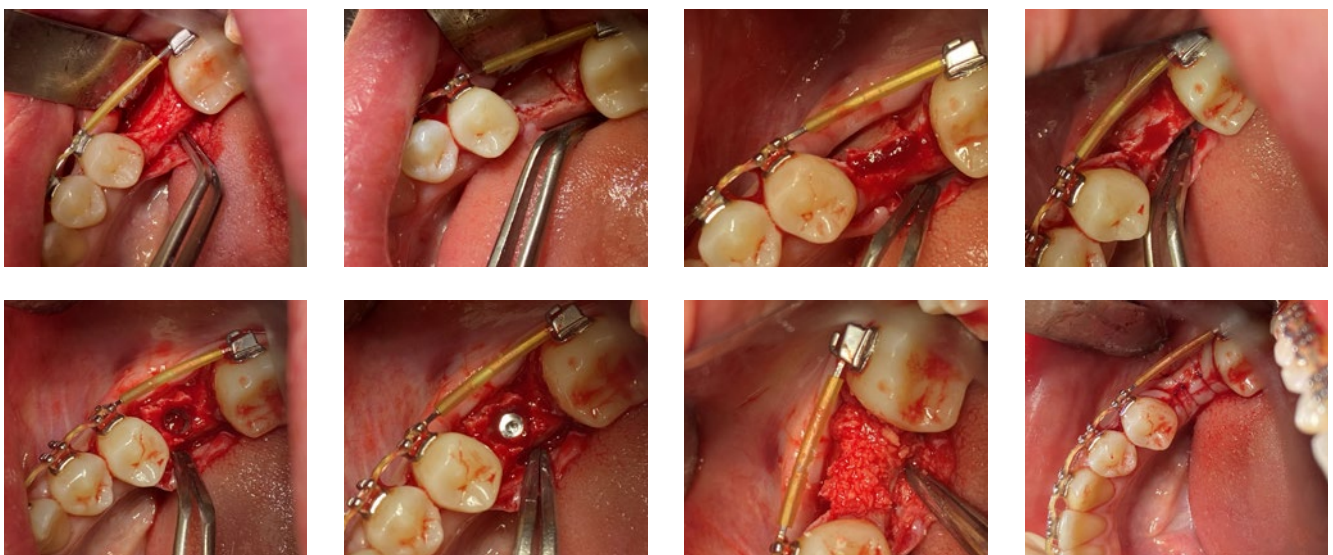


Fig. 8. Stages of surgical intervention in the tooth 3.6

Рис. 8. Этапы хирургического вмешательства в области зуба 3.6

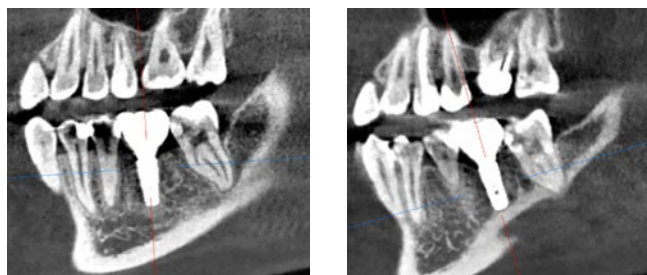


Fig. 9. X-ray monitoring of implant placement after 6 months

Рис. 9. Рентгенконтроль установки имплантатов спустя 6 месяцев

In the area of the tooth 3.6, the atrophy of the alveolar process is more pronounced, therefore, the first stage is the splitting of the alveolar process. Cuts are created and before forming the bed, the side wall is slightly dislocated, giving it easy mobility. Then the bed for the implant is prepared according to the method described above, again reaching the mill of the penultimate diameter. When dissecting, it is necessary to press the cutter slightly against the lingual wall, this helps to reduce the risks of breaking off the alveolar wall. In such cases, it must be remembered that during the first postoperative days, the edges of the cleavage may converge, strong pressure of soft tissues can lead to the convergence of bone fragments of the surgical field, squeezing out the osteoplastic material (especially if its consistency is elastic). As a result, the volume created during the operation can be significantly reduced. To prevent such an outcome, during the operation, when the bone fragments are separated and we have filled a third or half of the volume with osteoplastic material,

we place a small rectangular fragment of the cortical plate between the walls as a spacer. We make sure that this bone “brick” keeps the wall from shifting. We carry out the work at 300–350 rpm with good cooling, this eliminates the risks of overheating of the bone tissue. The implant is installed in a standard way.

After 4 months, bone tissue is formed in the cleavage and implants are integrated.

Conclusions

The surgical method proposed by us to increase the volume of the alveolar process before implantation has its undoubted advantages. The use of the technique of splitting the alveolar ridge with simultaneous installation of implants in cases of severe atrophy of the alveolar process of the jaws is an alternative to the generally accepted three-stage technique (osteoplasty + two-stage implantation). This allows you to significantly reduce the treatment time and successfully avoid bone grafting, which is a traumatic, long, expensive and unpredictable procedure. Indications for the method we use should be carefully evaluated before the operation, including the readiness of the doctor and the patient.

The choice of a technique for eliminating atrophy of the alveolar process depends on the initial state of the bone tissue. The technique we use shows that it can be recommended for use, the implant is stable after an average follow-up period of 1.44 years and does not show a tendency to destabilization. The observation period indicated by us is not very long, but inspires cautious optimism in the long-term preservation of the implant functions in the treatment of such features of the interaction of the implant with the human body.

The used splitting technique improves bone support for the installed implants, saves time and psychological resources of the doctor and the patient.

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