

PRODUCTIVITY OF CLOSURE OF HOLE USING A TOOTH FRAGMENT

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Abstract. This research work is aimed at studying the effectiveness of the method of using a tooth fragment to preserve the alveolar process during tooth extraction. Based on a review of the literature and analysis of modern clinical studies, key aspects of the effectiveness of the method were identified. Analysis of the structural stability of the alveolar process, functional results, as well as assessment of long-term consequences after using this method became the main directions of research.

Key words: method, use of a tooth fragment, preservation, alveolar process, effectiveness, reconstruction, dentistry, dental implantation, osseointegration.

INTRODUCTION

In modern dentistry, the main task is to preserve the alveolar growth, taking into account that the alveolar obstruction after tooth extraction has a strong impact on orthopedic procedures in the future. Therefore, the study and assessment of the methods of effective maintenance of the integrity of the alveolar barrier structure is a priority task for specialists in dental practice.

Today, the method of using a tooth fragment in order to preserve the alveolar barrier after tooth extraction in this direction is considered promising [17].

This method is aimed at reducing the size of the alveolar barrier using a tooth fragment and, in turn, reducing the development of complications during implant placement and prosthetics [6].

In this article, we aim to systematically analyze the effectiveness of this method, consider its advantages and disadvantages, as well as evaluate the prospects for its use in clinical practice. In addition, the article aims to identify the main factors affecting the success of this process and to conduct a comparative analysis with alternative approaches to alveolar bone preservation.

The alveolar barrier is an important anatomical structure, the alveolar cells of the jaws ensure the integrity and retention of teeth [26]. It is a bone tissue consisting of plates of dense bone tissue that surrounds the teeth and provides stability to the roots of the teeth. The alveolar barrier has a complex morphology and consists of alveolar ridges and eges that provide additional support and strengthening of teeth [2,5].

The structure of the alveolar growth shows high variability depending on the location in different sections of the jaws. In the upper jaw, the alveolar ridge has a flatter shape with wide alveolar ridges that act as a support for the teeth. In the lower jaw, the alveolar septum is more densely structured and is characterized by clear ridges that preserve the integrity of the roots of the lower teeth [49].

The structural features of the alveolar barrier play an important role in ensuring the stability of the teeth, their normal functioning during chewing and speaking. Understanding the anatomical characteristics of the alveolar ridge is a key factor in considering the effectiveness of methods to preserve this structure after tooth extraction [7]. Physiological processes occurring in the alveolar

process play an important role in maintaining its structural integrity and functional activity. After tooth extraction, a number of changes occur in the alveolar wall, which affects its shape and size [12].

The process of bone resorption is one of the main physiological aspects observed in the alveolar barrier after tooth extraction. This phenomenon begins in response to the loss of the functional load carried by the tooth and leads to a gradual decrease in the volume of bone tissue [13]. In addition, changes in the activity of osteoblasts and osteoclasts affect the remodeling of the bone structure of the alveolar wall, which can lead to its deformation and loss of shape [8].

At the same time, regeneration and repair processes also play an important role in maintaining the integrity of the alveolar barrier. Normally, the osteogenesis system is capable of ensuring the restoration of bone tissue and maintaining its optimal structure. However, if this process is disturbed, pathological changes such as bone atrophy and degradation can develop, which can significantly complicate further surgical interventions or prostheses. [4,9,30].

Thus, understanding the physiological processes occurring in the alveolar barrier is important for developing effective methods of tooth preservation after extraction. Adequate restoration and preservation of the structural integrity of the alveolar ridge can significantly complicate and worsen the patient's quality of life.

In the field of dentistry, various methods are widely used to preserve the alveolar barrier, including alveolar plastic surgery, the use of resorbable materials, membranes, and bone substitutes. Alveolar plastic surgery is a set of surgical methods aimed at restoring the anatomical structure of the alveolar barrier using various materials such as bone implants or synthetic materials [1,14,22]. In addition, the use of resorbable materials has a stimulating effect on the growth processes of bone tissue, stimulates its renewal and prevents resorption. At the same time, the use of membranes is aimed at creating a barrier that promotes a more efficient process of bone tissue restoration, protecting the alveolar process from soft tissue invasion. In addition, the use of bone substitutes is aimed at stimulating the growth and regeneration of bone tissue, compensating for its loss, and maintaining the structural integrity of the alveolar process. These methods play an important role in preserving the structure of the alveolar barrier and optimizing the results of dental interventions, and the choice of a particular method depends on the individual characteristics and clinical characteristics of the patient [34,46,50].

It is important to evaluate the effectiveness of the methods of alveolar bone preservation in use, to determine the optimal approach to preserving its structural integrity. One of the main indicators of this method is the ability to preserve the size of the alveolar tumor after tooth extraction. Methods that reduce bone resorption and preserve its anatomical structure are more effective. Effective methods should help to activate the processes of bone tissue restoration and stimulate the growth of osteoblasts, which ensures more effective restoration of the alveolar barrier. Assessing the frequency and severity of complications associated with the use of a particular method is also an important measure of effectiveness. Methods with minimal risk of complications and unwanted consequences for the patient are considered preferable. Methods that ensure the long-term maintenance of the alveolar barrier are preferable from the point of view of clinical practice [31,38,39,40].

The effective choice of the method depends on the characteristics of the specific clinical situation, the anatomy of the patient and his medical needs (Table 1).

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Table No. 1. Advantages and disadvantages of existing methods of preserving the alveolar barrier [3,10,15,16,18,19,20,25,28].

Method	Advantages	Disadvantages
Alveolar plastic	Provides the ability to restore the significant volume of bone tissue.	Requires surgical skills and special equipment.
	It allows to achieve systemic stability of the alveolar barrier.	May involve additional recovery and rehabilitation time for the patient.
	It can be adapted to the specific anatomical features of the patient.	There is a risk of complications such as infection and transplant rejection.
Application of absorbable materials	It helps to stimulate bone tissue regeneration without additional surgical interventions.	It may take a long time to completely restore bone tissue.
	It reduces the risk of complications associated with surgical procedures.	Individual reactions to materials can cause different reactions in patients.
	It can be more cost-effective than other methods.	Limitation of regeneration, especially in cases of significant bone loss.
Use of membranes	It allows creating a protective barrier that prevents soft tissue penetration and provides optimal conditions for bone tissue regeneration.	Complications related to rejection of the used membrane or infections may occur.
	It can be easily incorporated into surgical procedures without additional complications.	Additional surgery may be needed to remove the membrane.
	High predictability and controllability of the regeneration process.	Some types of membranes can be more expensive, which can affect the cost of treatment.
Use of bone substitutes	Allows to compensate for bone loss and stimulate the regeneration of bone tissue.	Some bone substitutes may have limited efficacy in stimulating regeneration.
	It can be more convenient and cost-effective than other methods	Individual characteristics of the patient can cause different

		reactions to bone substitute materials.
	When using modern technologies, it reduces the need for additional surgical interventions.	In rare cases, there may be a risk of allergic reactions or rejection.

The method of using a piece of tooth to preserve the alveolar barrier, also called autotransplantation, is a surgical procedure aimed at installing or transplanting a natural tooth from one part of the jaw to another. This method can be used when removing one or more teeth, then preserving the alveolar barrier, especially in cases where there is a high risk of bone deformation or resorption [11,41,52,64,66].

The process of autotransplantation usually involves several steps, including preplanning and anatomical assessment of the donor and recipient sites, extraction of the tooth from the donor site, preparation of the alveolar barrier to accept the transplanted tooth, and implantation of the tooth at the new site. [21,23,27].

The main principle of this method is to preserve the alveolar barrier by restoring the normal anatomical structure with the help of a transplanted tooth. This approach ensures optimal retention of the transplanted tooth and enhancement of bone regeneration in the alveolar area [29,39,63,68].

However, it should be noted that this procedure requires special skills and experience in dental and alveolar tissue surgery, as well as careful planning to achieve optimal results and minimize possible complications [58,59,64].

Over the next decade, the use of tooth fragments to preserve alveolar bone has evolved significantly with improvements in diagnostic techniques, surgical instruments, and osseointegration technologies. The development of computer tomography and 3D modeling also played an important role in optimizing planning and predicting the results of this method [57,62,67,70].

Currently, the method of autotransplantation is an effective alternative for maintaining the alveolar barrier and maintaining the optimal balance of dental implants. Continuous research in the field of dentistry and orthopedics continues to contribute to the development and improvement of this technique to ensure the best results of treatment and improve the quality of life of patients.

The structural features of the tooth are one of the important factors affecting the effectiveness of the method of using a tooth fragment to preserve the alveolar barrier. These structural features include anatomical and morphological characteristics of the tooth, such as size, root shape, quality of dentine and enamel tissue, periodontal tissue condition. A successful transplant depends on the match between the donor and the recipient. The appropriate size and shape of the tooth roots ensures a more effective adaptation and integration in the new place. Inconsistencies in size or shape can lead to complications such as tooth malposition or alveolar process deformation. A healthy state of dentin and enamel tissue is an important factor for a successful tooth transplant. Poor tissue quality may increase the risk of trauma during the implantation process or have negative consequences for the surrounding tissue [32,47,58]. Optimal health of periodontal tissues, including gingival tissue and alveolar bone, is a key factor for successful adaptation of a transplanted tooth. The presence of inflammatory processes or other periodontal pathologies can negatively affect the process of osseointegration and the ability of the tooth to maintain a stable position in a new place [33,56].

A comprehensive evaluation of these structural characteristics of the tooth allows to reduce the possible risks and complications associated with tooth transplantation.

Factors affecting the success of the method are closely related to various aspects of the surgical procedure, which play a decisive role in the results of the procedures. A number of factors related to preparation, surgical indications, and postoperative care in the process of using a tooth fragment to preserve the alveolar barrier have a significant impact on the success of the method. Important aspects are preplanning, surgical technique, use of appropriate materials and methods, effective postoperative treatment and follow-up. Care of the alveolar barrier plays an important role in ensuring positive results after using the method of using a tooth fragment to preserve the alveolar barrier. Important factors include regular medical examinations, inflammation control, stress management, and proper wound care [35,48,56].

A review of modern clinical research shows an active interest in the method of preserving the alveolar process using a tooth fragment. Studies have included analyzes of structural stability, functional outcomes, osseointegration, and patient satisfaction demonstrating the value of this technique in reconstructive jaw surgery [36,42,44,52].

The use of the method of preserving the alveolar barrier with the help of a tooth fragment demonstrates its universal capabilities in various clinical situations. It is effective for reconstruction after trauma or periodontitis, restoration of jaws after oncological surgery, as well as rehabilitation after maxillofacial injuries. In addition, the method is successfully used in aesthetic dentistry, implantology and prosthetics [41,45,51].

During the rehabilitation period after maxillofacial injuries, this method allows to restore the anatomical integrity of the jaw bone, helps to replace teeth and restore the functions of chewing and phonoarticulation. In aesthetic dentistry and orthopedics, this method helps to create a natural-looking tooth and tooth row, providing surgical solutions to restore the shape and function of the teeth, taking into account the individual characteristics of the patient. In the field of implantology and prosthetics, this method provides strength and stability for implants and prostheses, contributes to the long-term successful rehabilitation of patients with complete or partial loss of teeth [37,43,54,55,61,65].

The method of using a tooth fragment to preserve the alveolar process revealed its importance in the field of reconstructive dentistry. Analyzing the anatomy and physiology of the alveolar barrier, considering the methods of preservation used, and studying the advantages and disadvantages of different approaches allowed a wider understanding of the importance of this method.

Conclusions from the review show the effectiveness of the method in ensuring the structural stability of the alveolar bone, despite the limitations associated with the surgical technique and the limited application in some clinical situations.

Further research in this area will help to better understand the mechanisms of action of this method, to improve the technique of its application, as well as to expand the scope of its application to achieve optimal results in patients with various dental problems.

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