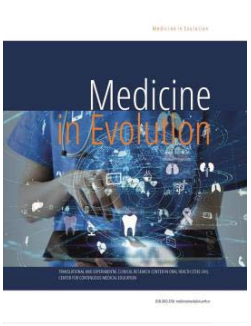
The healing process of the postextractional alveolar bone of the wisdom tooth



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Abstract

Aim and objectives: Wound healing after tooth extraction is a dynamic process and represents an ongoing challenge in the surgical field. Specialists have focused their attention on healing management, addressing various treatment techniques. In this context, the aim of this study is to research and analyse the factors that influence the healing of the post-extraction alveolar bone of the wisdom tooth.

Material and methods: This observational study analyses the healing process and the complications that appear after the tooth extraction.

Conclusions: The study demonstrated that most patients did not experience post-extractional healing complications. Postoperative management of patients who experienced complications resulted in complete recovery.

Keywords: socket healing; tooth extraction; complications

INTRODUCTION

The healing response has been an essential defence mechanism of the human body since its inception. Injury, in any form, initiates a complex series of closely related and often overlapping biological events, the primary goal of which is to restore tissue integrity [1]

All tissues follow an essentially identical pattern composed of three main phases: inflammatory, proliferative, and remodelling. The type of tissue can influence, however, the specific characteristics of each phase. Delayed healing of certain injuries may be the effect of the surgical procedure itself or the type of wound and may have various clinical manifestations [2].

The surgeon has the ability to identify early signs and symptoms of complications both in the post-extractional alveolar socket and in the peri-alveolar soft tissues. He is also the one who can intervene in a timely manner to ensure the direction of wound healing [2].

In the case of tooth extractions, the post-extractional alveolar bone contains cortical bone, is enveloped by destroyed periodontal ligaments and a band of fixed mucosa. The blood clot that forms after extraction has the role of isolating the bone from the bacterial environment in the oral cavity [3].

The inflammatory phase (postoperative days 3-5) is characterized by vasoconstriction of the injured blood vessels by the aggregation of circulating platelets that adhere to each other to form a fibrin clot. Thus, the bleeding is stopped, and the blood clot is formed. After haemostasis is achieved, vascular permeability is increased, allowing blood plasma and other cellular mediators of healing to pass through the capillary walls. Even now, on the entire surface of the bone cortex, osteoclasts begin to accumulate. Symptoms such as swelling, and pain may occur [4].

The proliferative phase (14 days postoperatively) represents the moment of formation of the granulation tissue containing inflammatory cells, and the body begins the process of collagen secretion. The tissue changes colour and the scar forms. The alveolar bone is covered with osteoid tissue, which prevents the development of the post-extractional bone. At the end of the third and fourth week, the epithelialization process is complete, and the deposition of new trabecular tissue on the bottom of the socket begins. [4]

Complete absorption of the edge of the cortical bone occurs after 4-6 weeks from the moment the tooth was removed. The bone fulfils the socket, and the epithelium covers the upper part, sometimes even reaching the level of the adjacent fixed mucosa. One year after the tooth extraction, only a scarred tissue can be observed at the level of the alveolar ridge.

The factors that can influence the post-extractional healing are represented by local and general factors: haemorrhage, edema, hematoma, dehiscence, alveolitis, smoking, malnutrition, diabetes, radiotherapy etc.

Aim and objectives

The purpose of this study is to research and analyse the factors that influence the healing of the post-extraction alveolar bone of the wisdom tooth.

MATERIAL AND METHODS

The retrospective study includes patients that required extractions of teeth 1.8, 2.8, 3.8 or 4.8. The patients were informed that these cases will be included in a medical research and their written consent was requested, according to Ministry of Health Order 1411 of 12.12.2016, annex no. 1 to the methodological norms - Form for expression of the consent of the informed patient.

All patients who underwent extraction of wisdom teeth under local anesthesia were included in this study. During the clinical examination, the patients' oral hygiene, the position of the wisdom teeth, but also the possible conditions and diseases that contraindicate tooth extraction (malignant tumours, cardiovascular, hepatic, endocrine diseases, etc.) were evaluated.

The inclusion criteria are:

- patients over 18 years;
- female and male patients;
- extraction of 1.8, 2.8, 3.8 or 4.8;

The exclusion criteria are:

- minor patients (under 18);
- patients who, following the clinical examination, were found to have acute infectious processes, malignant tumors;
- patients diagnosed with certain associated conditions that contraindicate dental extraction (malignant tumors, cardiovascular, hepatic, endocrine diseases, etc.)

The patients were examined clinical and radiological. All information obtained was recorded in the patient record.

The degree of difficulty of the procedure is directly correlated with the accessibility of the tooth to be extracted. Accessibility is determined by the radiological examination regarding the position of the teeth in the alveolar, the morphology of the roots and the stage of evolution are observed; as well as neighbouring structures: the bone density of the proximal environment as well as the proximity of adjacent teeth.

RESULTS

In this study, 80 patients were included, during January 2023 – June 2023, 38 males (47.5%) and 42 females (52.5%). The age of the included patients was as follows: 55 patients were between 18 and 30 years (68.75%), 20 patients between 31 and 50 years (25%), respectively 5 patients between 50 and 70 years (6.25%).

In order to pass the selection stage and be included in the study, patients had to require surgery on their wisdom teeth. Thus, for 22 of the cases the extraction of upper right molar 1.8 was necessary (27.5%), for 18 of them the intervention took place at the level of 2.8 (22.5%), for 15 cases the extraction was done on 3.8 (18.75%), and for 25 it was performed at the level of 4.8 (31.25%).

Following the clinical examination, the patients included in the study presented different indications for extraction. Thus, 42 cases were diagnosed with acute apical periodontitis (52.5%), 28 cases presented with carious lesion complicated with fracture of the crown (35%), in 4 cases grade 3 tooth mobility was discovered (5%), and for 6 of the cases the wisdom teeth has orthodontic indication for extraction (7.5%).

Different extraction techniques were required during the surgeries, depending on the patients' needs. The simple forceps extraction technique was used for 31 of the cases (38.75%), elevator extraction through distal dislocation for 28 cases (35%), extraction with root separation for 6 cases (7.5%) and extraction with buccal alveolotomy for 15 cases (18.75%). Suturing the post-extractional socket is not always necessary for all surgeries. In this study, it was used in only 20 of the 80 cases (25%), 60 of the patients (75%) not needing this procedure.

Among the selected patients, for 5 cases postoperative healing was complicated with post-extractional haemorrhage (6.25%), 4 cases presented with post-extractional alveolitis (5%) and 7 cases suffered delayed healing (evaluated at 2 weeks) (8.75%). For the remaining 64 cases, there were no complications in post-extractional healing (80%).

Among the 5 patients who presented with a complicated healing with post-extractional haemorrhage, 3 patients indicated an early haemorrhage occurring a few hours after the molar extraction (60%), while in 2 of them the haemorrhage started late, after a few days from the moment of the intervention (40%).

Post-extractional alveolitis was present in 4 cases, with only one patient indicating its development at the maxillary bone (25%) and 3 patients (75%) at the mandibular bone.

During the control after the surgical intervention, the probing height measured postoperatively on the distal face of the neighbouring anterior tooth with the extracted wisdom molar was also checked. The results showed that it decreased in height by 1-2 mm in 49 cases (61.25%), remained unchanged in 28 cases (35%) and increased in only 3 cases (3.75%) by 1 mm in 2 cases, respectively by 2 mm for 1 case.

DISCUSSIONS

Surgical extractions are defined by the American Dental Association as the surgical removal of an erupted tooth that requires elevation of a mucoperiosteal flap and removal of bone and/or a section of the tooth. [5] Tooth extraction is one of the most common procedures in dentistry in general and in oral surgery in particular.

Surgical extraction may be necessary in cases of impaction of the tooth into bone and/or soft tissue, dental caries below the bone level, insufficient remaining clinical crown, fracture of the tooth or root, the presence of periapical lesions or disease, and other conditions that can only be diagnosed by the dentist. [5]

Throughout time, wisdom teeth have represented a continuous challenge in dentistry due to the diversity of their development and their interaction with the rest of the dentition. Wound healing after tooth extraction is a dynamic process and is an area of major interest in the surgical field. The factors that influence the extraction of wisdom teeth have been the subject of several specialized studies, and researchers have focused their attention on healing management, approaching various treatment techniques. [6]

In the case of wisdom teeth, surgical extraction involves ostectomy and surgical soft tissue implication, resulting in pain and edema as part of the normal inflammatory response. Potential complications include bleeding, infection, nerve damage or jaw fracture. [6]

Risks are influenced by background factors such as the patient's age, gender, and health status, in addition to clinical factors such as bone density, tooth position, degree of impaction, and surgeon experience.

Given that wisdom tooth extractions are prone to more complicated healing, there are numerous studies in the specialized literature that have researched this aspect over time. Although the study carried out in this study did not have such a large number of patients included, the results obtained are similar. For example, a study conducted by Wasiu Lanre Adeyemo et al evaluated the clinical pattern of post-extractional wound healing to identify the types, incidence and pattern of healing complications following tooth extraction. Two hundred eighty-two patients (282) from 318 extractions were evaluated for socket healing. The results of the study showed that most of the post-extractional sockets healed without problems. A few cases of alveolar osteitis were recorded (8.6%), and in a few patients, post-extractional alveolar healing was also complicated by alveolitis (1.2%) [7].

CONCLUSIONS

This study indicates that when the surgical intervention is performed by specialized doctors, patients seriously follow the post-extractional care recommendations and proper oral

hygiene, the healing process proceeds without the appearance of adverse effects and certain severe complications.

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