EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 4
Issue: 12
383-385
Year: 2017

BONE HEALING AND SOFT TISSUE CONTOUR CHANGES FOLLOWING MANDIBULAR FIRST MOLAR RIDGE PRESERVATION - A CLINICAL AND RADIOGRAPHIC 12-MONTH PROSPECTIVE STUDY

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Article Received on 01/10/2017 **Article Revised on 21/10/2017** **Article Accepted on 11/11/2017**

ABSTRACT
Alveolar ridge preservation is an important procedure following tooth extraction when delayed implant placement is planned as a treatment procedure. The aim of the present study was to assess bone formation in the alveolus and the contour changes of the alveolar process following tooth extraction. The tissue changes after removal of a premolar or molar in 55 patients were evaluated in a 12-month period by means of measurements on study casts, linear radiographic analyses and subtraction radiography. The results demonstrated that major changes of an extraction site occurred during 1 year after tooth extraction.

KEYWORDS: Alveolar ridge, extracted socket, bone grafts.

INTRODUCTION
Ever since the introduction of dental implants in modern odontology, prevention of edentulous jaw atrophy due to anatomical changes and physiological processes that occur after tooth extraction have been studied in the past extensively. Proper positioning of the implant in relation to the adjacent teeth, anatomical structures, existing alveolar ridge and the occluding dentition gives maximum probability of the survival of implants which provides adequate function and esthetics.[1] The basal bone that forms the overall skeleton and the body of mandible and maxilla. After tooth extraction, the bundle bone that lines the alveolar socket and makes a part of the periodontal anatomy, enclosing the terminations of the Sharpey's fibers appears to be the first bone to be absorbed[4] whereas alveolar process that allow tooth eruption and contains the tooth alveolus gets gradually absorbed throughout life. The remodeling process results in a ridge morphology reduced in vertical height and more palatal in relation to the original tooth position. Periodontal disease, periapical pathology and trauma to the teeth and bone occur due to loss of alveolar bone loss. The traumatic removal of teeth results in bone loss; they are to be prevented.[2] The alveolar bone suffers atrophy after tooth extraction. To obtain functional and esthetically satisfactory prosthetic reconstructions an understanding of the healing process of post extraction sites, including contour alterations caused by bone resorption and remodeling.

MATERIALS AND METHODS
55 patients (40 women, 15men), referred for extraction of Mandibular f irst molar extraction and subsequent delayed single-tooth implant treatment, were included in this study. The study teeth comprised 37 mandibular right 1st molar and 18 mandibular left 1st molar. Mean patient's age was 45 years (range 21 to 59years). The reasons for extraction included only traumatic and endodontic lesions, root fractures, endodontic treatment failures and advanced carious lesions. The patients were given oral and written consent regarding the study. Following local anesthesia, the teeth were gently luxated with an elevator and carefully extracted with an extraction forceps, attempting to produce an atraumaic extraction, avoiding damage to the bone circumscribing the alveolus. The patients, agreed not to wear any prosthesesduring the 12-month healing period. Clinical and radiographic evaluationof the extraction site was carried out at baseline and at 3, 6 and 12 months following tooth extraction.

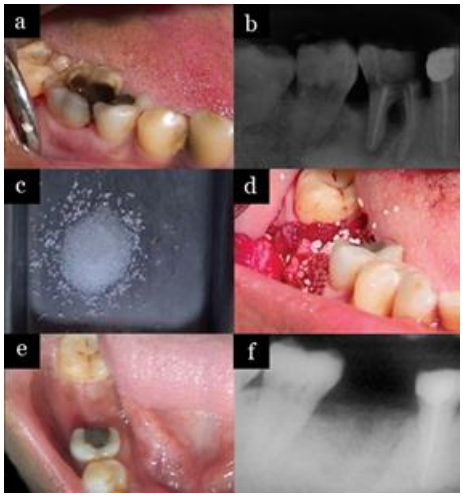
Clinical radiological evaluation
Immediately after tooth extraction, the alveolar socket filled with blood clot that was replaced by granulation tissue within a week. In socket healing, the epithelium migrates over the granulation tissue to cover the healing socket. This happens because the inflammatory tissue mimic as a connective tissue by the epithelial cells, therefore, cellular migration occurs over its surface

reforming to provisional matrix. Mineralizing processes occur leading to the formation of woven bone that eventually is replaced by mature lamellar bone.

Within 2-4 days, the blood clot begins to break down, fibrinolysis occurs. The proliferation of mesenchymal cells leads to gradual replacement of the coagulum by granulation tissue. By the end of 1 week, a vascular network is formed and by 2 weeks the marginal portion of the socket is covered with new connective tissue filled with inflammatory cells and blood vessels. By 4–6 weeks, alveolus are filled with woven bone, while the soft tissue becomes keratinized. At 4–6 months, the mineral tissue within the original socket is reinforced with layers of lamellar bone that is deposited on the previously formed woven bone. Several recent studies have examined resorption patterns following single-tooth extraction. Using subtraction radiography, Schropp and others11 assessed, in a 12-month prospective study, bone formation in the alveolus and changes in the contour of the alveolar process following mandibular first molar-tooth extraction. The width of the alveolar ridge decreased 50% (from 12 mm to 5.9 mm, on average) and two-thirds of the reduction occurred in the first 3 months. The percentage of reduction was somewhat larger in the molar compared with the premolar region. Changes in bone height, however, were only slight (less than 1 mm). The level of bone regenerated in the extraction socket never reached the coronal level of bone attached to the neighbouring tooth. The bone surface were "curved" apically.[3]

RESULTS

The contours of the alveolar processes changes continuously after teeth extractions because of the bone resorption and subsequent structural rearrangement. This remodelling happens in two phases: the initial resorption occurs in the first three months and is part of the healing process. During initial resorption, new bone formation and loss of alveolar crest height happens simultaneously with a reduction of approximately two-thirds of the ridge width. The process continues over the three following months. Between six and twelve months, part of this newly formed bone undergoes remodelling and approximately 50% of the reduction of the alveolar ridge width occurs. The second phase is slower and continuous which occurs throughout the individual's life.



DISCUSSION

Osseointegrated implants requires the evaluation of the available bone volume, as the previous extraction may lead to different patterns of bone remodeling and resorption. When a tooth is yet to be extracted; several techniques may help clinicians to preserve the alveolar process, thus creating ideal morphology of the implant site. This becomes even more important when the goal is to avoid bone augmentation procedures during implant placement. Investigations revealed that significant alveolar bone volume will be lost because of resorption after tooth extraction. Up to 50% of the alveolar ridge can be lost over 12 months, and approximately two thirds of initial resorption occurs within the first 3 months. Moreover, the loss in width of the alveolar ridge is reported to be greater than the loss in height.[4]

CONCLUSION

Post extraction alveolar ridge resorption is an inevitable process and the molar area is not an exception. Molar ridges present higher degrees of resorption than premolar areas do. Many choices are available to the clinician and success is based on the care taken by the clinician at the time of extraction through mini maltrauma. Ridge preservation is merely one aspect of successful implant therapy. After tooth extraction, a significant reduction of the alveolar ridge in the horizontal/buccal-palatal dimension occurs (initial resorption) if the socket does not receive some type of treatment. The socket filling with bone graft can be significantly improved with preservation techniques. The maturation and mineralization of the newly formed bone in the extraction socket can be accelerated or improved by ridge preservation.

The success of osseointegrated dental implants depends on the volume of healthy bone at the recipient site at the time of implant placement. The placement of an implant at a site with a thin crestal ridge (e.g., postextraction ridge) could result in a significant buccal dehiscence. Thus, it seems important to prevent alveolar ridge from resorption and make efforts to preserve it during extraction procedures.

Maintenance of an extraction socket for future implant therapy does not exclude immediate implant placement, but knowledge and experience are needed to determine the best treatment modality. Within inclusion criteria of this study, the results of the present investigation promote the use of a bone substitute to fill the postextraction site of posterior teeth to avoid alveolar bone loss.

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