



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2018; 4(3): 276-280
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www.oraljournal.com
Received: 01-05-2018
Accepted: 05-06-2018

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The quality assessment of maxillary, mandibular bone, maxillary sinus and its willingness form for dental implants without need of bone grafting in the southern region Saudi patients

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Abstract

Introduction: Anatomical changes and physiological processes taking over tooth extraction were studied in the past however, since the introduction of dental implants in modern odontology, these issues and the prevention of edentulous jaw atrophy have become very hot topics. The survival of implants and their ability to provide adequate function and esthetic are strictly correlated with their proper positioning in relation to the alveolar housing, the neighboring teeth and the occluding dentition. It is thus easily understood the tremendous effort that has been used by many researchers and practitioners in reducing this unavoidable modeling and remodeling process.

Aim: The purpose of this study was to determine the vertical changes of maxillary and mandibular bone after bone resorption due to tooth extraction and Quality Assessment of Mandibular Maxillary bone, Maxillary sinus and its willingness form For dental implants without need of bone Grafting in the southern region Saudi patients by using panoramic radiograph.

Material and Method: Standard panoramic radiographies were performed. This cross sectional study was conducted at KKU Dental faculty. The patients' panoramic radiographs that were needed before and after 6 month of extraction were taken. 112 panoramic radiographies were evaluated, The distances of Alveolar Ridge after extraction measured and the vertical Alveolar Ridge changes were also measured. Standard panoramic radiographs of 16- to 66 -years-old patients were reviewed, 112 subjects who visited KKU Dental faculty were enrolled in this study, and had extraction indication of one or more single-rooted teeth with alveolar bone preservation.

Results: Panoramic radiographs have been used frequently as a radiographic method for pre- and post-extraction evaluation, it was determined whether the tooth extracted from Maxilla or mandible after evaluation of the panoramic vision by Dr. Rakan Saed Al-thobaiti and Dr. Muhannad Abdulrhman Halwani on each of the following we found that the extracted teeth is more in maxilla than mandible (Fig 1). The pattern of the bone loos was determined as horizontal or vertical. The result was that the horizontal pattern was common at about 4 times the vertical pattern (Fig2). It was also determined whether the extracted tooth was common in the anterior or posterior teeth and we found that the result was that the posterior was common at about 4 times the anterior (Fig3). It was also determined whether the extracted tooth central or canine or premolar or molar (Fig 4) Finally, the amount of bone retraction at the central site of extracted tooth was calculated by mm, where reached the average distance is 1.85 mm (Fig 6 C,D).

Discussion: Radiography is the only non-invasive method available to plan treatments involving the mandible. Panoramic radiographs are commonly used to screen, diagnose, and select the best possible surgical approach. Panoramic radiographs were utilized because of certain advantages over intra-oral radiography.

Conclusion: In summary, diagnostic imaging is an integral part of dental therapy for preoperative planning, intraoperative and postoperative assessment by use of variety of techniques to assess the bone whether grafting is needed or not, but it seems that patients who lose their teeth in the highlands need to be grafted as soon as possible because of slow process of healing after the extraction of teeth and lack of oxygen in highlands like Abha city.

Keywords: mandibular maxillary bone, maxillary sinus

Introduction

Anatomical changes and physiological processes taking over tooth extraction were studied in the past however, since the introduction of dental implants in modern odontology, these issues and the prevention of edentulous jaw atrophy have become very hot topics. The survival of implants and their ability to provide adequate function and esthetic are strictly correlated with

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their proper positioning in relation to the alveolar housing, the neighboring teeth and the occluding dentition. It is thus easily understood the tremendous effort that has been used by many researchers and practitioners in reducing this unavoidable modeling and remodeling process.

The alveolar healing process following tooth extraction has been extensively studied throughout the history of dentistry, and has attracted more attention in the last two decades due to the advent of dental implants. This paradigm shift has generated renewed interest in the healing, remodeling and resorption processes of alveolar sockets post- extraction. Several authors have analyzed the physiological healing process that occurs after tooth extraction, and described the remodeling and resorption process ^[1, 2, 3] where the total volume of the socket is markedly reduced and presents wall resorption and bone filling in its center. It has been determined that bone resorption is greater on the vestibular crest than on the lingual or palatal crest of the alveolus. Vestibular bone resorption occurs not only in vestibulo-lingual direction but also along the apical- coronal tooth axis ^[4]. The greatest degree of resorption in post-extraction sockets occurs during the first six months after the extraction ^[5].

The bone remodeling process that takes place after tooth extraction determines the optimal position in which an implant should be placed as replacement. Physiological changes that take place in the alveolus after dental extraction make the pursuit of the highest esthetic and functional requirements difficult at the time of the patient's prosthetic rehabilitation. The decision on the timing of implant placement, in relation to tooth extraction, must be based on a proper understanding of the structural changes that take place in the alveolar ridge after the loss of a tooth. Various techniques have been described for measuring alveolar ridges, through analysis techniques, subtraction radiography, intraoperative models and measurements through re-entries at treated sites ^[6]. The results described have varying degrees of reproducibility and accuracy, according to the technique applied.

Bone healing is an important subject in various fields of dentistry such as prosthesis, implant, surgery, etc. Numerous studies and researches have been done on tooth socket healing process however, most of these studies are histological evaluations and less are radiographic studies. The healing time of bone has been evaluated using different methods in these studies. Ellis *et al.* ^[7] believe that this time is 4-6 months for both jaws. They also state that during the healing time, tooth socket cortical bone will disappear and the fossa is replaced by the bone. Newman *et al.* ^[8] consider the time needed for healing of mandibular tooth socket and healing of maxillary tooth socket to be 4 and 6 months, respectively. Ejlali ^[9] also believes that because the healing process lasts 2-3 months after tooth extraction, the treatment of prosthesis patients should be done thereafter.

For visibility of bone changing image in the conventional radiograph, the bone mineralization should be at least 40 percent; otherwise, it is not visible in the radiograph ^[10]. On the other hand, digital subtraction radiography method is capable of showing 5% decalcification ^[11].

Aim

The purpose of this study was to determine the vertical changes of maxillary and mandibular bone after bone resorption due to tooth extraction and Quality Assessment of Mandibular Maxillary bone, Maxillary sinus and its willingness form For dental implants without need of bone

Grafting in the southern region Saudi patients by using panoramic radiograph.

Material and Method

Standard panoramic radiographies were performed. This cross sectional study was conducted at KKU Dental faculty. The patients' panoramic radiographs that were needed before and after 6 month of extraction were taken. 112 panoramic radiographies were evaluated, The distances of Alveolar Ridge after extraction measured and the vertical Alveolar Ridge changes were also measured. Standard panoramic radiographs of 16- to 66 -years-old patients were reviewed, 112 subjects who visited KKU Dental faculty were enrolled in this study, and had extraction indication of one or more single-rooted teeth with alveolar bone preservation.

Exclusion criteria

Were blood dyscrasia, pregnancy, human immunodeficiency virus, uncontrolled hypertension, need for antibiotic prophylaxis or being under antibiotic treatment, uncontrolled diabetes, fractured teeth with alveolar wall damage and smoking. The reasons for tooth extractions were non-restorable caries, root fracture and periapical infection. A medical, clinical and radiographic history was made for each subject and they all received hygiene instructions, and, if required, periodontal and other therapy, the data were analyzed using SPSS software (version 11.2).

Radiologic examination Panoramic radiographs have been used frequently as a radiographic method for pre- extraction evaluation and the preparation of treatment protocols. Although the resolution and sharpness of panoramic radiographs are less than those of intraoral radiographs, panoramic radiographs is an excellent tool for the overview of the maxillofacial area, including many of the vital structures, such as maxillary sinus, inferior alveolar nerve and nasal fossa, Panoramic radiography units are widely available, making this imaging technique very useful and popular as a screening. (Figure 1 A, B).



Fig 1: A - Standard panoramic radiograph.

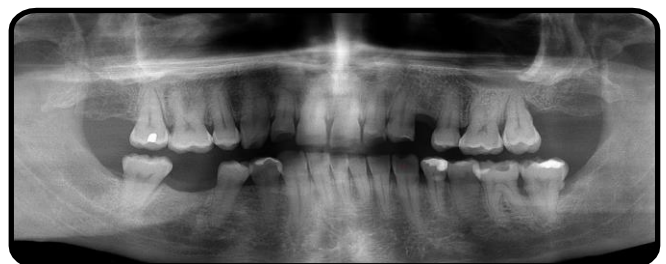


Fig 1: B - Standard panoramic radiograph for 63 M P shown that bone resorption after 6 months from tooth extraction.

Panoramic radiography placement Information acquired from panoramic radiographs must be applied judiciously because

this technique has significant limitations as a definitive preoperative planning tool. With regard to panoramic radiographs, the lack of image sharpness and resolution, coupled with no uniform distortion often leads to inaccurate interpretation and measurements (Benson & Shetty, 2009; Chan *et al.*, 2010). The magnification of panoramic radiographs can be >30%, especially when patients are not in the optimal position. Angular measurements on panoramic radiographs tend to be accurate, but linear measurements are not. Vertical measurements are unreliable because of foreshortening and elongation of the anatomic structures because the x-ray beam is not perpendicular to the long axis of the anatomic structures or to plane of the image receptor. Similarly, dimensional accuracy in the horizontal plane of panoramic radiographs is highly dependent on the position of the structures of interest relative to the central plane of the image layer (Benson & Shetty, 2009). However, the magnification factor can be calculated at the given site by dividing the actual diameter of the object by the diameter measured on the radiographs (Resnik *et al.*, 2008).

Results

Panoramic radiographs have been used frequently as a radiographic method for pre- and post-extraction evaluation, it was determined whether the tooth extracted from Maxilla or mandible after evaluation of the panoramic vision by Dr. Rakan Sawwd Al-Otaibi and Dr. Muhannad Abdulrhman Halwani on each of the following we found that the extracted teeth is more in maxilla than mandible (Fig 1).

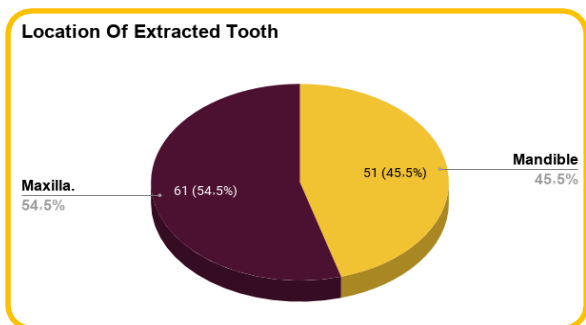


Fig 1: Percentage of patients in addition to their number for maxilla and mandible.

The pattern of the bone loos was determined as horizontal or vertical. The result was that the horizontal pattern was common at about 4 times the vertical pattern (Fig2)

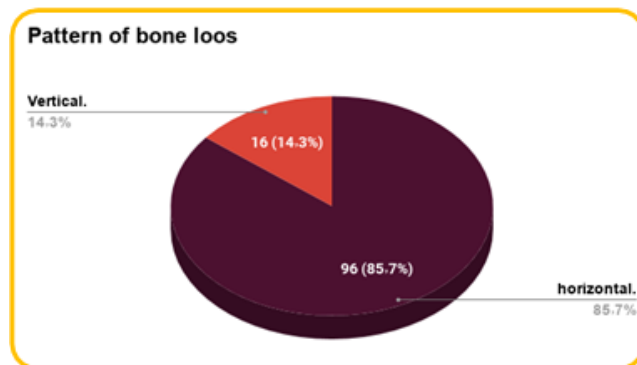


Fig 2: Percentage of the pattern of the bone loos

It was also determined whether the extracted tooth was common in the anterior or posterior teeth and we found that the result was that the posterior was common at about 4 times the anterior (Fig3)

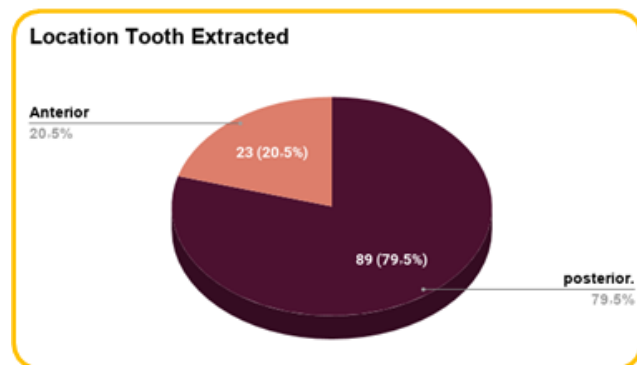


Fig 3: Percentage of location of extracted tooth was common in the posterior teeth.

It was also determined whether the extracted tooth central or canine or premolar or molar (Fig4).

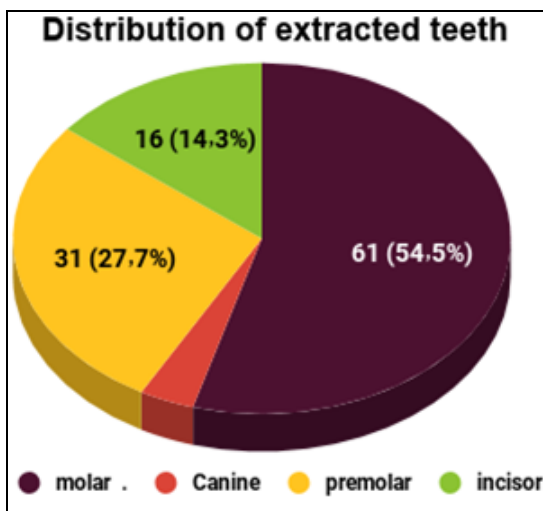
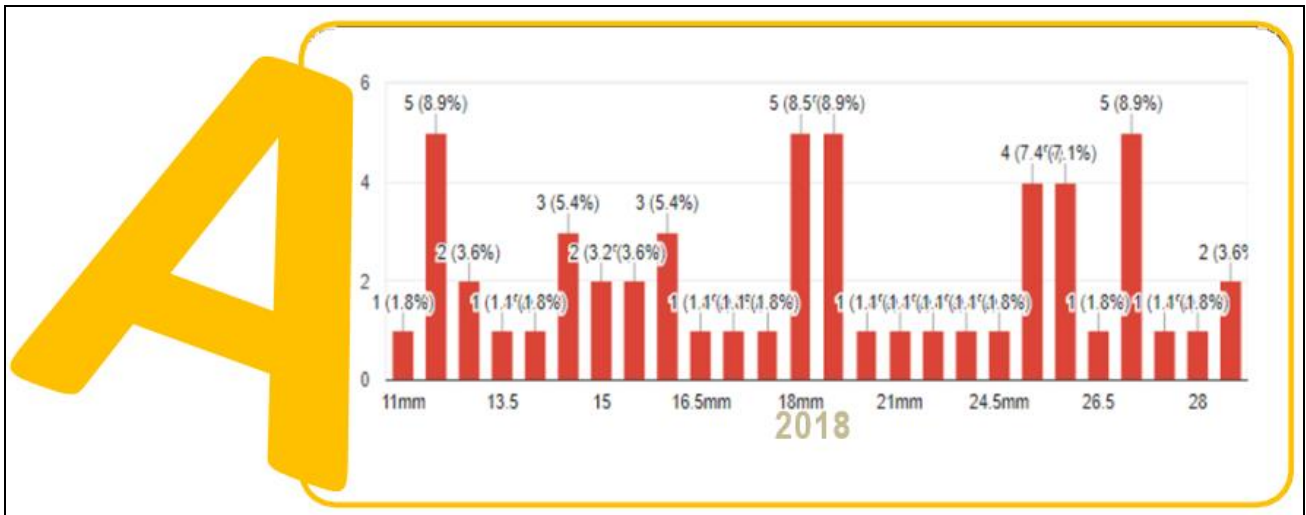


Fig 4: Distribution of extracted teeth.

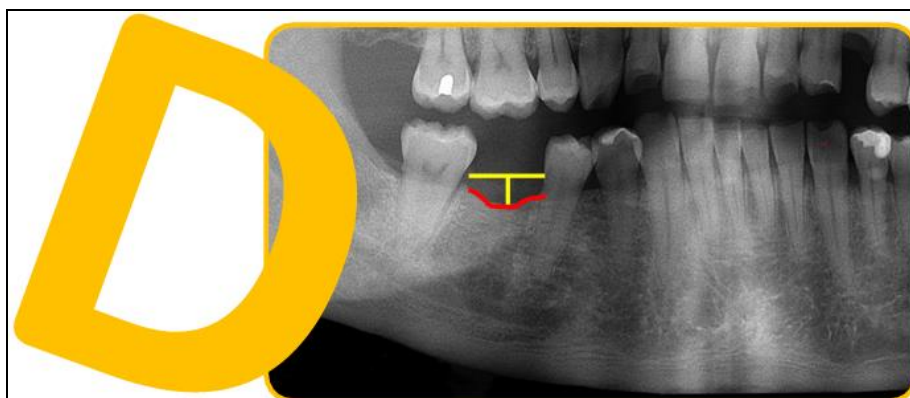
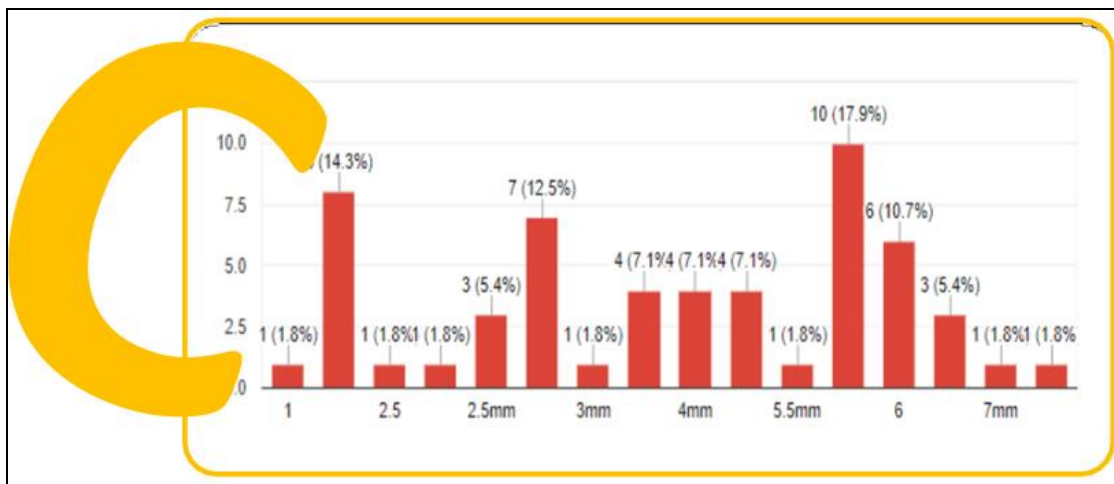
The distance between the superior and inferior border of alveolar bone at the site of extracted tooth was calculated by

mm, where reached the average distance is 21.5 mm (Fig 5 A, B).



B). The Yellow arrow showing that the distance between the superior and inferior border of alveolar bone at the site of extracted tooth

Finally, the amount of bone retraction at the central site of extracted tooth was calculated by mm, where reached the average distance is 1.85 mm (Fig 6 C, D).



D) The Yellow Red arrow showing that the amount of bone retraction at the central site of extracted tooth,

Discussion

Radiography is the only non-invasive method available to plan treatments involving the mandible. Panoramic radiographs are commonly used to screen, diagnose, and select the best possible surgical approach ^[12]. Panoramic radiographs were utilized because of certain advantages over intra-oral radiography.

They include a greater area of hard and soft tissues and the visualized area in continuity that allows for a more accurate localization of the Alveolar Ridge changes in both horizontal and vertical dimensions. The panoramic view is practical in clinical studies because it provides a more accurate picture of the Alveolar Ridge in two dimensions ^[13, 14, 15]. 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. Socket grafting techniques have been readily adopted by dentists throughout the world. A great amount of research has been conducted to examine the effectiveness of several materials or membranes. The study of QDRS indicated that the most changes in the tooth socket occurred in the first 4 months after tooth extraction and the healing process of tooth socket was slow after the 4th month. It means that the difference between the digital numbers at month 4 and 6 was not significant. That is in agreement with Ellis *et al.* ^[7] study who stated that the socket would completely be replaced by the bone during 4-6 months. It is also according to Newman *et al.* ^[8] who estimated 4 months for mandibular tooth socket healing. Schropp *et al.* ^[16] considered this time as 3 months.

Conclusion

In summary, diagnostic imaging is an integral part of dental therapy for preoperative planning, intraoperative and postoperative assessment by use of variety of techniques to assess the bone whether grafting is needed or not, but it seems that patients who lose their teeth in the highlands need to be grafted as soon as possible because of slow process of healing after the extraction of teeth and lack of oxygen in highlands like Abha city.

In general, good starting point would be proceed with panoramic radiograph and possibly intraoral radiographs if greater image detail is required. If images are required of all of the maxilla and mandible to evaluate possible implant sites, cross-sectional images assists to clinician, panoramic radiograph can be used in evaluation of the rate of alveolar ridge bone resorption in the tooth socket allowing the identification of vertical changes that occur in the alveolar ridge after extraction.

Acknowledgement

We wish to thank the College of Dentistry for all the technical and administrative support received during the course of this study. We are also immensely indebted to DR. Abdullmajeed Saeed Ali Alshahrani for their help.

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