Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 10, pp.39893-39896, October, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

RADIOGRAPHIC ASSESSMENT TOOLS IN DENTAL IMPLANTOLOGY

Dr. Nilima S. Rajhans, *Dr. Swapnil S Jadhav, Dr. Nikesh Moolya, Dr. Nilkanth Mhaske, Dr. Dhanesh Sable and Dr. Nilesh Salunkhe

Department of Periodontology and Implantology, YCMM and RDF's Dental College, Ahmednagar, India

ARTICLE INFO

Article History:
Received 10th July, 2016
Received in revised form
22nd August, 2016
Accepted 18th September, 2016
Published online 30th October, 2016

Key words:

Dental implants,
Radiography,
Diagnostic Assessment.

ABSTRACT

Radiographic assessment is a significant tool in evaluating the quantity and the quality of the alveolar bone, locating any anatomical landmarks, and/or detecting pathological lesions. It helps the clinician to visualize and judge the likelihood of executing the proposed treatment plan. In addition to determining bone dimensions accurately, the available technical advancements in radiography have helped improve case design and treatment planning, thus conferring upon clinical results a measure of predictability. This, in turn, has helped the dental team select the proper candidate for implant therapy; implant size and design; surface texture and angulation; and the surgical technique to be utilized for implant placement.

Citation: Dr. Nilima S. Rajhans, Dr. Swapnil S Jadhav, Dr. Nikesh Moolya, Dr. Nilkanth Mhaske, Dr. Dhanesh Sable and Dr. Nilesh Salunkhe, 2016. "Radiographic assessment tools in dental Implantology", *International Journal of Current Research*, 8, (10), 39893-39896.

INTRODUCTION

Implant positioning in the alveolar ridge is dependent on the location and morphology of the potential osseous receptor site and its contiguous structures. Because the contour and thickness of the oral mucosa can mask the actual dimensions of the underlying osseous structure, a thorough radiographic examination is essential for diagnosis and treatment. This examination is to make note of what is and is not radio graphically present, with any deviation from normality duly recorded. Radiographic assessment is a significant tool in evaluating the quantity and the quality of the alveolar bone, locating any anatomical landmarks, and/or detecting pathological lesions. It helps the clinician to visualize and judge the likelihood of executing the proposed treatment plan. In addition to determining bone dimensions accurately (Gher and Richardson, 1995), the available technical advancements in radiography have helped improve case design and treatment planning, thus conferring upon clinical results a measure of predictability. This, in turn, has helped the dental team select the proper candidate for implant therapy; implant size and design; surface texture and angulation; and the surgical technique to be utilized for implant placement.

Corresponding author: Dr. Swapnil S Jadhav,
Dept of Periodontology and Implantology, YCMM and RDF's Dental College, Ahmednagar, India.

There are numerous radiological techniques and views available, and each has its own merits and drawbacks. The clinician should be able to select the most suitable method for each patient particularly. Sophisticated radiography, as digital computed scans, is not mandatory for every single alveolar ridge evaluation. However, some patients require sophisticated radiographic investigations for assurance of attaining a successful treatment plan.

Periapical Radiographs

Periapical and panoramic views are examples of two very commonly used views in dental treatment. They offer only a two-dimensional image, where bone height and density may be gauged. These views can also be helpful in evaluating the condition of the periodontium or pulp. They are also used to assess the location of the roots relative to the neighboring anatomical structures and/or a particular future implant receptor site. Acquiring periapical and panoramic x-ray views is cost effective, as the radiographic devices can be readily available in the dental office, are easy to use, and involve minimal additional expense for the patient. (Figure 1). The periapical view has a unique advantage over other types and views of x rays. It is the only available method for routine monitoring of crestal bone levels around previously restored dental implants.

It can also be a valuable reference that the clinician can resort to at the time of surgery to determine the depth of drilling. Conversely, periapical radiography has some inherent shortcomings. These inadequacies are represented in a slight magnification of images that is not consistent and that varies according to the technique used. Consequently, an image in a periapical film doesn't represent the actual size of an object. Another disadvantage is the small size of the film, which restricts the viewed area, thus limiting its clinical applications. Periapical radiographs, however, are considered valuable in the treatment planning for single tooth implants. Modern periapical digital radiographs have reduced 90% of the radiation exposure. They have eliminated the need for films and subsequent film processing. The regular film is replaced with a sensor that is connected to a computer, where the image can be viewed instantaneously (Misch, 1999). The radiation reduction has benefited both the clinician and the patient, where digitalization has allowed for taking several views in a shorter time without fear of radiation hazard. It is thought to be cost effective in comparison with the regular radiographic views. Occlusal views have very limited applications because of superimposition of anatomical structures, changes in the x-ray tube angulation that can lead to distortion in most of the images, and difficulties encountered in accessing the posterior regions of the oral cavity.

Panoramic radiographs

Panoramic radiography (Figure 2) is believed to be the standard technique for radiographic examination in the treatment planning for patients receiving dental implants.It shows the hard and soft tissue anatomy and the related structures of the maxilla and mandible in a single film. However, although it is considered the most popular two-dimensional view in oral implantology treatment, it has its own shortfalls: it fails to show the width of the object. Panoramic views also have lower resolution (especially in the anterior zone) than intraoral radiographs. Moreover, when these radiographs are magnified to 15-22%, it is difficult to calculate the exact bone height, or mesiodistal distance, without performing a mathematical calculation to eliminate the magnification factor. In spite of its disadvantages, however, panoramic radiography will remain the radiographic examination tool of choice in dental implant treatments because of its simplicity and affordability.Periapical and panoramic views are not the only views that are applicable in dental implantology. Lateral cephalometric radiographs are usually used in order to focus on the anterior maxilla and mandible. Here, the trajectory and angulation of the residual alveolar ridge are required. Therefore, cephalographs provide information regarding the angulation of the implants to be placed.

Figure 1. Intraoral Periapical Radiograph

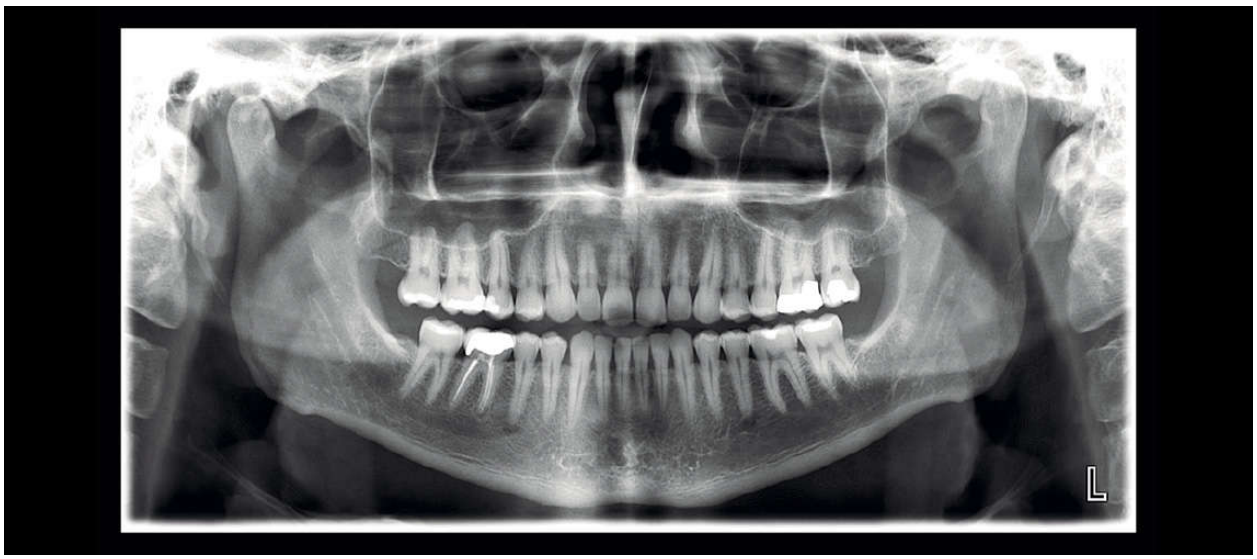

Figure 2. Panaromic Radiograph

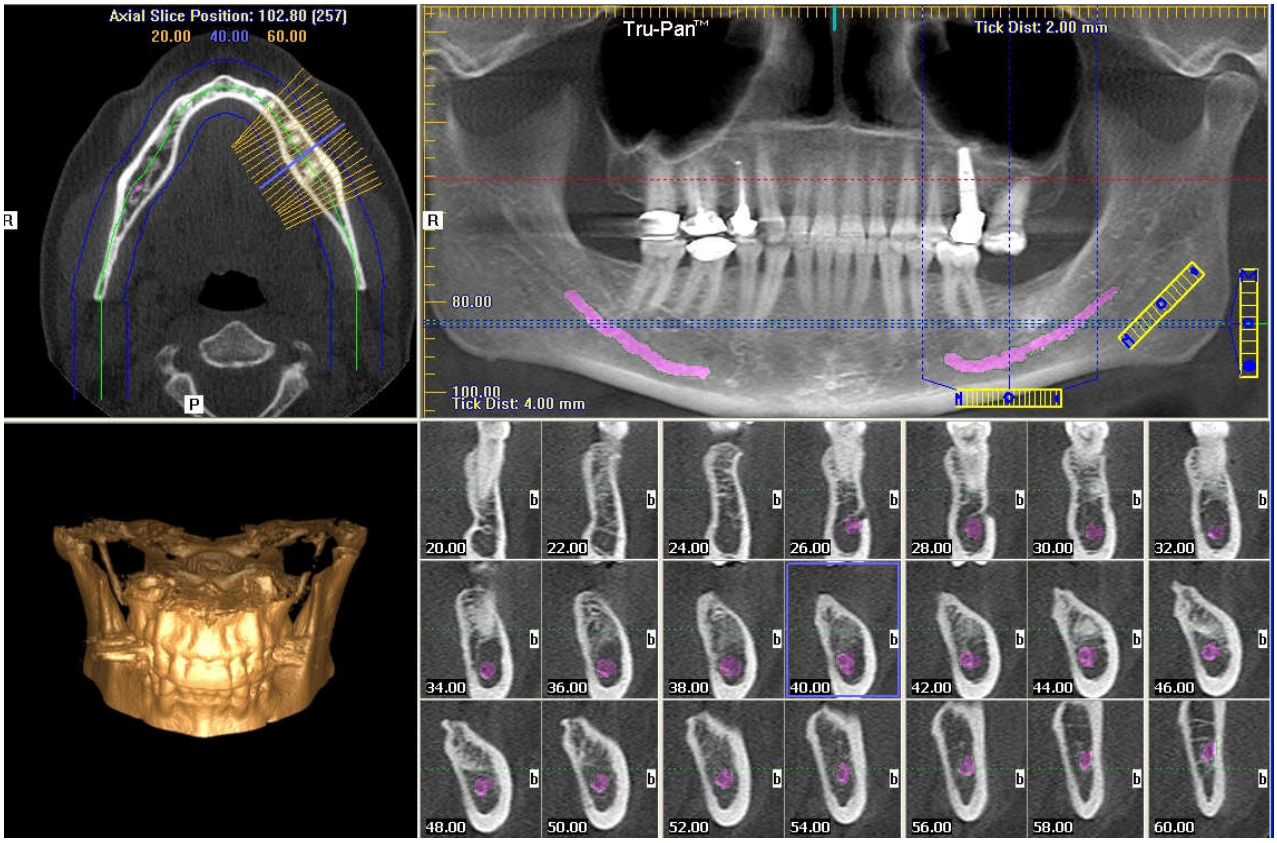

Figure 3. Cone Beam Computed tomography image

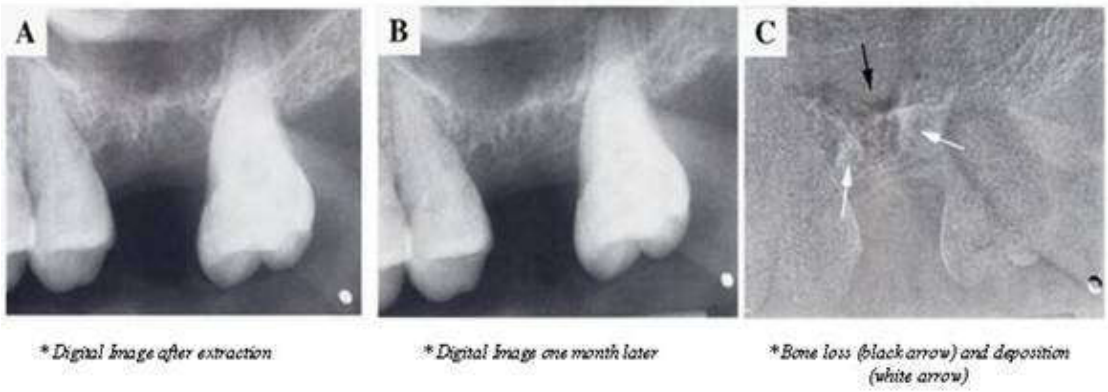

Figure 4. Digital Substraction Radiographic Image

They are, however, limited in their application in dental implantology to completely edentulous patients.

Computerized tomography (CT)

Dental implants in general have benefited from computed dental radiography. Computerized tomography (CT), specifically, offers several advantages. It produces sharp images, eliminates the need for film processing, utilizes a lower dose of radiation, presents precise measurements directly without magnification, and provides a digital image that can be stored on the computer for future comparisons. Computerized tomography (CT) is based on a software program that constructs a three-dimensional model. It creates clear tomographic sections for the alveolar bone, and differentiates between soft and hard tissues clearly as never before. It reformats the image data to create a tangential and cross-sectional tomographic image of the future implant site; it also verifies the bone quality precisely.

This three-dimensional model is computed using several radiographic views from specific angles. Because of its ability to provide a complete three-dimensional image, CT provides a highly sophisticated format for precisely defining jaw structure and locating critical anatomical structures (Misch, 1999) (Figure 3). Dentascan (MPDI, Torrance, California) is considered to be one of the most modern applications of computerized tomography (CT) in implant dentistry. It generates a referenced cross-sectional and tangential panoramic image of the alveolar bone along with threedimensional images of the arch. It consists of a software modification of the CT data to produce images specifically helpful for preoperative assessment of the alveolar bone before implant placement. It provides serial slices through the alveolar ridge at specific intervals. The surgeon is then able to visualize the alveolar bone in a three-dimensional image and measure the size of the ridge directly from the scan. This method has its limitations in terms of high cost, critical head tilting position of the patient, requiring a compensation for

magnification, and the increased time needed for generation of the images (Schartz *et al*., 1989). Magnetic resonance imaging may be used to appraise the existing alveolar bone, especially for use with dental implants. It is a useful scanning method that may be utilized in areas where CT software programs are not available, or for patients who don't desire or cannot be exposed to further radiation.

Digital subtraction radiography (DSR)

To date, digital subtraction radiography (DSR) is the most versatile and sensitive method for measuring bone loss. It can detect both bone height and changes in bone mass surrounding dental implants. DSR addresses the limitations in detecting postoperative changes that are present in other radiographic modalities. By eliminating information that has not changed, DSR allows the clinician's eye to focus on actual changes that have occurred between the recordings of two images. This feature makes comparison easier, and any uncertainties about the procedure's success can be laid to rest (Shikha Nandal, 2014). Selection of the most suitable radiographic view requires rational decision and sound judgment. Sophisticated and expensive radiographic procedures may sometimes not be helpful in detecting the various parameters needed to make a precise diagnosis, and the regular readily available radiographic techniques may be sufficient.

REFERENCES

Gher, M.E. and Richardson, A.C. 1995. The accuracy of dental radiographic techniques used for evaluation of implant fixture placement. *Int J Periodont. Rest Dent.,* (15): 268-283

Misch, C.E. 1999. Single tooth implant. In Misch CE, ed. Contemporary Implant Dentistry. St. Louis: Mosby, 397-428

Misch, E.C. 1999. Diagnostic casts, preimplant prosthodontics, treatment prostheses, and surgical templates. In Misch CE, ed. Contemporary Implant Dentistry, St. Louis: Mosby, 135-149.

Schartz, M.S., Rothman, S.L., Chavetz, W. and Rhodes, M. 1989. Computed tomography in dental implant surgery. *Dent Clin North Am.,* (33): 565-597.

Shikha Nandal, Dr. Himanshu Shekhawat, Pankaj Ghalaut. 2014. *International Journal of Enhanced Research in Medicines & Dental Care*, Vol. 1 Issue 4, June-, pp: (1-4),

****