MEASUREMENT CT-SCAN OF THE JAW BONE AS A PANORAMIC RADIOGRAPHY FACTOR CORRECTION TOWARDS PANORAMIC USED FOR DENTAL IMPLANT PLACEMENT

(PENGUKURAN CT-SCAN PADA TULANG RAHANG SEBAGAI FAKTOR KOREKSI TERHADAP PANORAMIK UNTUK PENEMPATAN IMPLAN GIGI)

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Abstract

One of the important factors that plays a role in the success of dental implant treatment is the accuracy of evaluating the quality and quantity of jaw bone. Parameter of quality and quantity of jaw bone that will receive the implant is the bone picture of diagnostic information in three dimensional objects which are the thickness, width and height of the jaw bone. To obtain information, digital technology such as CT-Scan is needed in order to get the parameters of the jaw bone which is relatively more accurate. This study aimed to assess the measurement of CT-Scan in the jaw bone as a correction factor of the panoramic radiography for dental implant placement. The study was a cross-sectional. Analysis the subjects used jaw bones patient who had lost a posterior maxilla or mandible. Total sample was 60 jaws, each sample went through CT-scan and Panoramic radiography to know the thickness, width and length of the jaw bone used for dental implant placement. The results showed that there was significant difference ($p<0.05$), of the length of the jawbone between on CT-Scan and Panoramic radiography. It can be concluded that CT-Scan is a tool that can assess jaw bone measurement that is more accurate than Panoramic radiography for dental implant placement.

Key words: CT-Scan, panoramic radiography, dental implant, jaw bone

INTRODUCTION

One of the important factors that play a role in the success of dental implant treatment is the accuracy of evaluating the quality and quantity of jaw bone. Parameters of quality and quantity of jawbone that will receive the implant, the bone picture of diagnostic information in three-dimensional objects that is the width, height and thickness and density of the jaw bone. To obtain the necessary information in order to obtain the parameters of digital technology jaw bone which is relatively more accurate. An effort that can be done to improve the quality of diagnostic information radiographic quality and quantity of jaw bone in dental implant treatment, using a modern radiographic technique such as scanning computed tomography (CT-Scan) that can produce a picture of three dimension structures.[1-2]

CT-Scan was discovered by Hounsfield and was introduced to the world in 1972, but the CT original derived from the mathematical sciences in 1917 from an astronomy in 1956. CT-Scan first by appeared in the lighting department in health in the 1970's and successful when it replaces the complex tomography in the early 1980.[3]

Periapical radiography provides a jaw bone laterally and does not inform about the section. Despite the limitations of periapical radiography obtained because of the limitations of anoblique orientation, with 3-dimensional information is rarely used to image the implant. Periapical radiography can experience distortion and magnification images. By using the long cone parallel technique can reduce the distortion and magnification of less than

10%.[4]

Occlusal radiography is a technique that the film is placed on the occlusal plane and to obtain image large areas of the jaw bone, also showed the mouth of the desired tissue than can be obtained with periapical radiography that can provide information by cross sectional, also used to see the state mandibularal veolar ridge in the direction fasiolingual / buccolingual is very useful in the placement of the dental implant.[3]

Panoramic radiographic techniques that are widely used in various types of dental care. Equipment Panoramic radiography can be found at large, so that this technique became popular as a mean of selection / screening and comprehensive assessment of the oral cavity, this also led to a diagnostic technique is the basis for implant dentistry, however to implant preprosthetic quantitative imaging, Panoramic radiography base instead of the most widely diagnostic used. This radiographic technique produces an image of the jaw with a variety of thicknesses and magnification.[4]

Based on the facts on the ground, a variety of modern diagnostic radiographic imaging device has been used for dental implant treatment, such as CBCT, CBCT 3D abroad, but in Makassar, the availability of modern radiographic examination does not exist because the equipment is relatively expensive, so there are many dental implant practitioners which only use conventional dental radiographic examination.

In Indonesia, the availability of modern radiographic examination is still very limited. Many dental implant practitioners who only use the panoramic radiograph as a guide jaw bone evaluation, based on the recommendation of the implant manufacturers. From the survey radiographic dental implant treatment results in 18 implant practitioners in Jakarta, 44.44% to the manufacture of periapical radiographs, panoramic 94.44%, and only 38.89% using periapical and panoramic radiographs. From 109 cases of implant treatment survey results were obtained 22 cases (22.18%) suffered from bone damage to more than 50%. The absence of a formal report on the success of dental implant treatment in Indonesia, allowing the fact that this figure may actually be much higher. Failure of dental implant treatment not only causes financial loss, but also affects the patient's jaw bone condition, subsequent by even psychologically can be adversely affect pasien.[5]

From the circumstances that occurred above, the writer wanted to get and then introduced a modern radiographic techniques using CT-Scan to measure

the volume (width, thickness and height) and jaw bone density to be more accurate for the placement of dental implants with an affordable cost and the radiation dose received by patients lower. In terms of availability, it seems that CT-Scan is increasingly prevalent in many hospitals, especially in big cities in Indonesia. In Makassar, as far as the united searched, CT-Scan is available and more easier to find, especially compared to conventional dental panoramic radiography. Almost all hospitals in the city of Makassar has CT-Scan, but the panoramic plane more difficult to find. On the other hand, both general and dental implant practitioners have never use the CT-Scan as a means of making both pre-implantation and follow-up after implant placement. The reason may be because of ignorance about the advantages of CT Scan or because they think the CT Scan as a tool of investigation is too expensive and uneconomical. So far, they still rely on conventional dental radiographic examination, a combination of panoramic, periapical and occlusal to design and conduct follow-up of dental implants.

This study aims to assess the measurement of CT-Scan in the jaw bone as a correction factor towards panoramic radiography used for dental implant placement.

MATERIALS AND METHODS

The study was a cross-sectional analytical. In this study, each patient's jaw bone examined with CT-Scan imaging radiology and panoramic radiography to get the width and height size of the jaw bone for dental implant placement. The sample was all patients with had loss of a posterior tooth in the maxilla or mandible, aged 20-50 years-sex male and female were selected from the population and have met the inclusion and exclusion criteria. Sample size was 60 subjects. CT-Scan done at hospitals Dr. Wahidin Sudirohusodo Tamalanrea Makassar and panoramic radiographic examination performed in RSGMP Kandea Faculty of Dentistry, University of Hasa-nuddin, Makassar.

RESULTS

There was a significant difference in the width measurement accuracy mesiodistal jaw bone between CT-scan and the panoramic radiographic for the placement of dental implants, ($p < 0.05$) (Table 1).

There was a significant difference in the length measurement accuracy topapical jaw bone between CT-Scan and panoramic radio graphic for the place-

ment of dental implants, (*p*<0,05) (Table 2).

Table 1. Difference accuracy of CT-Scan of panoramic on mesion distal width jaw bone for dental implant placement

Radiographic Imaging	Measure of Jaw Bone (mm)		
	Mean	SD	*p*
CT-Scan MD	9.42167	2.329042	0.003
Panoramic MD	10.7017	2.433488	

Table 2. Difference accuracy of CT-scan of the panoramic in length top apical jaw bone for dental implant placement.

Radiographic Imaging	Measure of Jaw Bone (mm)		
	Mean	SD	*p*
CT-Scan TA	12.6233	2.763648	0,002
Panoramic TA	14.2467	2.811446	

DISCUSSION

A technical advances of digital radiography is recommended for dental implant treatment plan is computed tomography scanning, often called CT-Scan or CT. As with conventional tomography, this method can produce crosssectional piece of jaw bone. This technique has been introduced by Housfield in the 1970's. Efforts are made to produce the crown and cut sagittal images directly similar to the film tomograms. Sofeware computer that has been developed can transform this data into the axial piecepanoramic imaging and crosssectional multiplanar imaging. This transformation is known as reformatting or reconstruction.[6]

The advantages of CT-Scan include multiplanar display, high contrast, free from the blur imaging layer, the same magnification (enable obtained the same size with actual size on imaging), the availability of imaging analysis by computer, and 3-dimensional reconstruction. In addition, a lot of area to be treated dental implants can be evaluated in aone-timeekspose.[6]

Research conducted by Cavalcanti et al. in 1998 and Bou Serhal et al. in 2002, each experiment vitro and in vivo, and concluded that by using a CT-Scan, an accurate size can be obtained on imaging the foramen mentale, which is also considered to be it is important for planning dental implant treatment.[7]

In this study indicate radiological CT-Scan imaging beused as a correction factor value of panoramicradiography. Measurements on radiological imaging compared with CT-Scan and panoramic radiographic MD and TA obtained the results of different measurements, as well asttest on thestatic obtained significant results p<0.05.

Panoramic radiographic techniques that are wide-ly used in various types of dental care. Panoramic radiography plane can widely, so that this technique became popular as a means of screening or selection and assessment.The advantages of panoramic radiography is to demonstrate the upper jaw and lower jaw in a lumpsum, the general status of the teeth are still there, as well as the adjacent anatomical structures. To preimplant treatment, panoramic used to make preliminary estimates of the top jaw bone and cortical border mandible canal, maxillary sinus and fossa nasalis.[8]

Limitations of the panoramic radiographic quality and sharpness is not as good as radiographic intraoral. In addition to image sharpness is not good, this is a limitation of panoramic radiographic magnification or enlargement of the picture. Magnifications which this occurs differ significantly on any device Panoramic and even on different object regions in the same movie, this is mainly influenced by the form of focal trough or X-ray trajectory is different for each brand of device panoramic.[6]

Research conducted by Priaminiarti and Iskandar, to get the size of the horizontal magnification on panoramic radiographs varied between 0.70 to 2.2 times the actual size. Although there are several studies that say only 1:25 magnifying times in mid-focal trough.[1]

In the results of this study showed differences in the radiographic measure ment panoramic on mesio-distal width (MD) correction factor with CT-Scan. Value of radiological imaging accuracy or correction of the CT-Scan MD = 0881 X to the value of measurement of MD panoramic radiography, or in other words there panoramic magnifications of CT-Scan MD MD at 1136 X. Similarly, the length topapical (TA) there is a difference measurement on panoramic radiography compared with CT-Scan. Value accuracy or correction on CT-scan imaging radiology PA = 0886 X Panoramic radiography rate against the TA, or there are magnifications panoramic radiography of the CT-Scan TA at 1128 X. To obtain the width and height measurements jawbone was significant (p<0.05). In conclusion, CT-Scan is a tool that can assess jawbone measurement that is more accurate compare to the panoramic radiography for dental implant placement. Accurate values obtained at CT-Scan measurements can be used as a correction factor value to panoramic radiography for dental implant placement.

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