The Validity 0f Quantitative Computed Tomography for Assessment of Bone Quality in Potential Implant Site In Bone of The Mandible

Thesis

Submitted To the Faculty of Oral and Dental Medicine, Cairo University, For Partial Fulfillment of The Requirement of the Master Degree In Oral Radiology

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2011

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Acknowledgment

I like first to thank God who helped me to make this work.

I would like to express my sincere gratitude to **Dr.Adel Zein El Abden, professor** of Oral Radiology, Faculty of Oral and Dental Medicine, Cairo University for his generous effort, continuous encouragement, valuable guidance and real support throughout this study.

I am deeply indebted to **Dr.Hany Mahmoud Omar,** Assistant professor of Oral Radiology, Faculty of Oral and Dental Medicine, Cairo University for his sincere cooperation, great help and supervision throughout this study.

I am also deeply indebted to **Dr.Zeinab Abd-El Salam,** professor of Oral Radiology, Faculty of Oral and Dental Medicine, Cairo University for her great help and support.

My deep thanks are extended to **Dr .Mushira Dahaba,** Professor and head of Oral Radiology department, Faculty of Oral and Dental Medicine, Cairo University for her real help, support and encouragement all the time.

Finally, my deep thanks are extended to **staff members** of Oral Radiology Department, Faculty of Oral and Dental Medicine, Cairo University.

Dedication

To My beloved Father and

Mother for their unlimited support

To my dear husband

To my brothers and sister

To my lovely daughters

Zeina&Jana

بسم ا الرحمن الرحيم

"و قل ربى زدنى علما"

صدق ا العظيم

سورة طه أية١١٤

Table of Contents

List of Figures

List of tables

Introduction

Tooth is not only one of the most important organs of human body but also very weak organ. Based on the research of archaeology, tooth implantation originates from ancient china and Egypt where the ancestors used the gold and ivory as substitutes for the real tooth ***(Ganz et al. 2001).***

Before considering the actual placement of endosseous implants in the jaws, both the quality and quantity of bone must be assessed radiographically. A variety of imaging techniques are currently available, each with their own strength and weaknesses, and specific indications ***(Jacobs R 1997).***

Intra-oral radiography is best suited for single tooth replacement while panoramic radiography is most appropriate for the anterior mandible. However, when there is some doubt about he localization of adjacent anatomical structures, such as the alveolar nerve cross-sectional imaging with either reformatted CT or tomography is recommended ***(Jacobs R 1997).***

Conventional tomography involves less radiation and is a reliable alternative to CT when information is needed on a relatively limited edentulous span ***(Exestubbe A 1993).***

Conventional tomography is the most widely used modality for planning of complicated cases for its ability to obtain images free from superimposition of other bony structures, giving uniform magnification and its reliability in measurements and detection of bone quality ***(DeMorais JA 2007).***

An important advantage of CT is the improved visualization of critical anatomical structures such as the mandibular canal ***(Sonick M et al 1994).***

The addition of detectors to C.T scan meant that more anatomy could be visualized in a shorter amount of time and in greater detail, so allows rapid imaging with high quality (***Lewis 2001).***

Multi slice CT allows rapid imaging with a smaller burden on the patient and yields higher image quality while requiring a smaller exposure dose (***Lewis 2001).***

Detection of bone density plays an important role in the initial stability after implant placement and osseointegration during healing period. Moreover, it affects the decision regarding patient's selection implant type and surgical techniques used before any implant placement (***Shahlaie 2003).***

Review of Literature

DENTAL IMPLANTS

Many years ago, replacement of missing teeth was considered as a confusing situation for dentist as there was no optimal solution for this problem. Moreover, with the evolution in implantology, osseointegrated dental implants are nowadays the most suitable solution for replacement of missing tooth or teeth ***(Stanford 2005).***

Dental implant is defined as prosthetic device formed from alloplastic materials implanted into the oral tissues under the mucosa and/or periosteum and/or within the bone to give support and retention for a fixed or removable dental prosthesis ***(Stanford 2005).***

Types of dental implants

There are many implants available each designed for a specific function. Most are made of titanium, an inert metal which has been proven to be effective at fusing with living bone, a process known as {Osseo integration} ***(Smith RA 1992).***

1- Root form implants:

Root form implants are the closest in shape and size to the natural tooth root. They are commonly used in wide bone to provide a base for replacement of one, several or a complete arch of teeth. Osseo integrated root form implants are made up of fixture and an abutment. The fixture is the portion of the implant that is surgically embedded in the osseous tissue of the jaw. It is made of titanium, a material that promotes Osseo integration (***Woody RD et al 2002)*** **(Fig.1).**

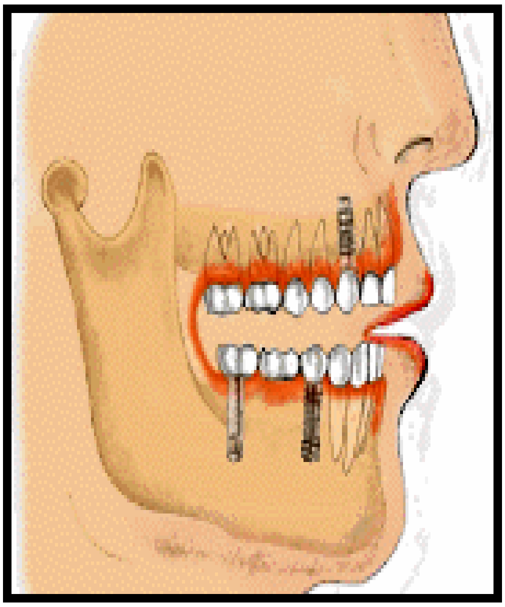

Fig. (1): Shows the root form implant, the implant and abutment act as a solid unit ready to support the new tooth or teeth ***(Woody RD et al 2002).***

2- Plate form implants:

Plate form implants are usually used when the bone is so narrow and the area is not suitable for bone grafting, the plate form implant is flat and long so it can fit into the narrow jaw bone ***(Woody RD et al 2002)*** **(Fig.2).**