COMPUTERIZED MORPHOMETRIC ASSESSMENT OF THE EFFECT OF LOW LEVEL LASER THERAPY ON OSSEOINTEGRATION OF IMMEDIATE IMPLANTS WITH GUIDED BONE REGENERATION

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By

Mahmoud Sayed Hamed

B.D.S, Ain Shames University

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Faculty of Oral and Dental Medicine,

Cairo University

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SUPERVISORS

Dr. Khairy Abd El-Hamied Elmorsy

Assistant Professor of Oral and Maxillofacial Surgery

Faculty of Oral and Dental Medicine, Cairo University

Dr. Gamal M. Moutamed

lecturer of Oral and Maxillofacial Surgery

Faculty of Oral and Dental Medicine, Cairo University

Dr. Ali Mohamed El-Hoseny Saafan

Assistant professor of Dental Laser Application

Laser Institute, Cairo University

بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم
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List of Abbreviations

GBR	Guided Bone Regneration
GTR	Guided Tissue Regneration
LASER	Light Amplification by stimulated Emission of radiation
EPTFE	Expanded poly tetraflouroethelene
LLLT	Low Level Laser Therapy
LILT	Low Intensity Laser Therapy
HILT	High Intensity Laser Therapy
SLAT	Selective Laser therapy
ALP	Alkaline Phosphatase
OP	Osteopontien
BSP	Bone Sialoprotein
HGF	Human Gingival Fibroblast
RFA	Resonance Frequency Analysis
CBCT	Cone Beam Computed Tomography
HU	Hounsfielde unit
ASTM	American Society of Mechanical Engineers
CT	Computed Tomography
HA	Hydroxyappatite
DFDBA	Demineralized Freeze Dried Bone Allograft
MFDBA	Mineralized Freeze Dried Bone Allograft

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Introduction

Marked qualitative and quantitative alterations occur in the alveolar ridge following the loss of teeth; cortical bone replaced by trabecular bone and reduction of the both bucco-lingual and apico-cronal dimensions of the extraction sockets occurs, thus tooth loss for different reasons may lead to alveolar resorption that can prevent proper positioning of dental implants according to prosthetic needs and treatment planning. (1)

Immediate implantation has provided implant dentistry the opportunity to achieve better functional and esthetic results. The localized bone defects surroundings implants placed immediately into fresh extraction sites present a challenge to the surgeon. The use of barrier membranes and different graft materials has been widely documented. (2)

Several authors have reported placement of implants into extraction sockets and augmentation of these sites with barrier membranes. (3, 4, 5)

Implants immediately placed in extraction sites and covered with expanded polytetrafluoroethylene (e-PTFE) barrier suggested that both osseointegration and bone reconstruction could occur with in extraction socket, but increased risk of membrane exposure during the healing phase has been reported, also nonresorbable membranes must be retrieved by employing a second surgical procedure that can disturb healing. (3, 4)

Recently, absorbable collagen membranes have been used for guided bone regeneration, to overcome the problems of nonresorbable membranes. (6)

Low level laser therapy (LLLT) has the potential of beneficial effects on peri-implant hard and soft tissues regeneration. Under stable

and no hurtful surgical conditions, irradiation with low-power laser could reduce healing time and accelerate implant osseointegrations. [7]

In the present study we aimed to evaluate the effect of low level laser therapy on bone repair and osseointegration of immediate dental implants with the advantages of using guided tissue regeneration.

Review of Literature

Immediate implantation is defined as the insertion of an implant into an empty alveolus when the mucosa is already open, immediately or only a few days after extraction or traumatic tooth loss. Placement of an implant will inhibit the alveolar ridge resorption that normally occurs following tooth loss, the time during which the patient is edentulous is short ended, because healing of the alveolus and healing of the implant occur simultaneously. [8, 9, 10]

Schult [11] was the first to place immediate implants into fresh extraction sites in humans and reported that the success rates were over 90%. Today, it is one of the most important alternatives in treatment edentulousm.

It was revealed by *Becker et al.,* [12] that immediate implants have several advantages for the patient as well as for the clinician, including shorts treatment time, less bone resorption, fewer surgical sessions, easier definition of the implant position, and a desirable esthetical results.

Placement of an immediate implant has the desirable effect of preserving alveolar bone width and height. When a tooth is extracted, predictable bone resorption ensues for six months. A typical defect of such resorption is a loss of crestal bone with a labial concavity. [13]

Delayed implant placement may result in compromised esthetics and function due to lingual placement of the implant. Hence, in certain circumstances, immediate implants will provide for more ideal prosthetic placement and will optimize esthetics, all via the preservation of bone.[13,14]

Block and Kent,[15] reported that the indications for immediate implantation were, traumatic loss of teeth with a small amount of bone loss, teeth lost because of gross decay without the presence of purulent exudates or cellulites, inability to complete endodontic procedures, presence of sever periodontal bone loss without purulent exudates, and adequate soft tissue health and quantity to obtain primary wound closure

Harris et al.,[16] concluded that the main disadvantage of immediate implantation was that following tooth extraction , a socket often presents dimensions that may be considerable greater than diameter of a conventional implant. Hence, following implant installation a gap may occur in the marginal part of the recipient sites.

Not all extraction sites suitable for immediate implantations, so certain clinical guidelines must be followed to select the suitable sites so immediate implant placement sites are classified into four classes according to Salama and Salama's [17]

Class 1 Ideal socket with no bone or soft-tissue compromises. Class 2 Similar to Class 1 but with a thinner more scalloped gingival biotype which may require connective tissue graft at time of implant placement or as a secondary procedure Class 3 Buccal bone is missing, however the implant can still be placed within the confines of the alveolar housing. In this case the surgical procedure will normally require simultaneous guided bone augmentation and connective tissue grafting. Alternatively these cases can be handled in a staged approach with socket augmentation followed by delayed implant placement.

However in Class 4 the remaining buccal plate is so severely damaged that simultaneous implant placement is almost certain to lead to