



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم



# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس التوثيق الإلكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**HANAA ALY**



**Evaluation of Soft Tissue and labial plate of  
bone stability of immediate implant in direct  
contact versus gap with socket shield**

**(A randomized clinical Study)**

*Thesis submitted to the Faculty of Dentistry, Ain Shams  
University in partial fulfillment of the requirement for Master  
Degree in Oral Medicine, Periodontology and Oral Diagnosis*

*Presented by*

**Amr Hany Abdullah**

B.D.S (2013)

Faculty of Dentistry, Ain Shams University

*Supervisors*

**Prof. /Hala Kamal Abdel Gaber**

Professor of Oral Medicine, Periodontology and Oral  
Diagnosis, Faculty of Dentistry, Ain Shams University

**Dr. /Doaa Adel Khattab**

Lecturer of Oral Medicine, Periodontology and Oral  
Diagnosis, Faculty of Dentistry, Ain Shams University

**2021**

## Dedication

To my precious **Mother** and **Father** who always support me, without them I wouldn't have achieved anything.

To all my **brothers** and friends specially that they always present for support.

To Lamees Tarik my fiancé for supporting me.

To Prof. Dr. Khaled barakat for igniting my passion towards dental periodontal surgeries.

## **Acknowledgement**

First of all, I want to Thank **ALLAH** for guiding and supporting me throughout my entire life.

I wish to express my deep appreciation and gratitude to Prof. Dr. **Hala kamal Abdel Jaber** Professor of oral medicine, periodontology and Diagnosis, Faculty of Dentistry Ain Shams University, for her support, guidance, giving me her clinical experience, continuous inspiration and valuable advices which were essential for the completion of this study.

My sincere gratitude to **Dr: Doaa Adel Khattab** Lecturer of Oral medicine, Periodontology and Diagnosis, Faculty of Dentistry Ain Shams University for her support, continues inspiration, clinical and academic supervision and generosity in giving me her time.

I owe special thanks to all my dear professors in faculty of Dentistry-Ain Shams University. Deep thanks to dear professors and my colleagues in ASU University.

Last but not least, great thanks to **my patients** for trusting me.

# List of Contents

	<b>Page</b>
List of abbreviations -----	i
List of Tables -----	ii
List of Figures -----	iv
Review of the Literature -----	1
Aim of the study -----	34
Subjects and Methods -----	35
Results -----	51
Discussion -----	78
Summary -----	94
Conclusions and recommendations -----	96
References -----	97
Arabic Summary -----	---

## List of abbreviations

EDS	Extraction Defect Sounding
<i>ERA</i>	Esthetic risk assessment
<i>CBCT</i>	Cone beam computed tomography
SRP	sagittal root position
DBBM	deproteinized bovine bone mineral
FDBA	freeze dried bone allograft
PRF	platelet rich fibrin
BMPs	bone morphogenic proteins
VEGF	vascular endothelial growth factor
PDGF	platelet-derived growth factor
TGF- $\beta$	transforming growth factor $\beta$ 1 and $\beta$ 2
GBR	Guided Bone Regeneration
PET	Partial extraction therapies
FPD	fixed partial denture
EMD	enamel matrix derivative
RCT	randomized control trial
SST	socket shield technique
RM	root membrane
FOV	field of view
PI	plaque index
KG	Keratinized gingiva
SD	Standard deviation
ISQ	implant stability quotient
SS	Socket shield
RST	root submergence technique



# List of Tables

Table	Title	Page
1-	Mean, Standard deviation (SD) values for the intergroup and intragroup comparison of width of keratinized gingiva (mm).-----	52
2-	Mean, Standard deviation (SD) values of width of keratinized gingiva change percentage change (%)-----	53
3-	Mean, Standard deviation (SD) values for the intergroup and intragroup comparison of thickness of keratinized gingiva (mm)-----	55
4-	Mean, Standard deviation (SD) values of thickness of keratinized percentage change (%)-----	56
5-	Mean, Standard deviation (SD) values for the intergroup and intragroup comparison of PES.-----	57
6-	Mean, Standard deviation (SD) values of PES percentage change (%)-----	59
7-	Mean, Standard deviation (SD) values for intergroup and intragroup comparison of clinical bone width (mm).-----	60
8-	Mean, Standard deviation (SD) values of clinical bone width percentage change (%)-----	61

## List of Tables (cont.)

Figure	Title	Page
9-	Mean, Standard deviation (SD) values for the intergroup comparison of crestal bone level change (mm)-----	63
10-	Mean, Standard deviation (SD) values for the intergroup comparison of radiographic bone width (mm)-----	65
11-	Mean, Standard deviation (SD) values for intragroup comparison of radiographic bone width (mm)-----	67
12-	Mean, Standard deviation (SD) values of radiographic bone width percentage change (%)-----	68
13-	Mean, Standard deviation (SD) values for the intergroup comparison of ostell measurements-----	69
14-	Mean, Standard deviation (SD) values for intragroup comparison of ostell measurements.-----	70
15-	Mean, Standard deviation (SD) values of Ostell measurements percentage change (%)-----	71
16-	Correlation between clinical and radiographic bone width-----	73

# List of Figures

Figure	Title	Page
1.	Diagram presenting Elian classification -----	6
2.	Diagram presenting EDS classification -----	8
3.	Subjects grouping -----	37
4.	Presenting pre-operative planning of implant placement using CBCT--	38
5.	<b>a.</b> Pre-operative occlusal view of remaining root to be prepared <b>b.</b> After decoronation of the crown <b>c.</b> sectioned root occlusal view <b>d.</b> Lingual part extracted with apex of root. <b>e.</b> pilot drill in place showing bucco-palatal and mesio-distal trajectory <b>f.</b> periapical intraoral radiograph showing pilot drill position apico-coronally <b>g.</b> implant placed in contact with socket shield <b>h.</b> implant placed palatal to shield leaving a gap <b>i.</b> Gap between implant and shield filled xenograft particles <b>j.</b> smart peg mounted to implant stability being measured <b>k.</b> screw-retained chair-side temporary restoration-----	41
6.	<b>a.</b> width of keratinized gingiva measurement, <b>b.</b> thickness of gingiva---	46
7.	<b>a.</b> pink esthetic score parameters , <b>b.</b> example of patient "PES measurement -----	46
8.	Bucco-palatal bone width measured using iwanson bone caliper-----	47
9.	Preoperative and postoperative CBCT of remaining root and implant---	48
10.	<b>a.</b> smart peg mounted to implant stability being measured , <b>b.</b> ostell measurements -----	49
11.	Line chart showing average width of keratinized gingiva (mm)-----	52
12.	Bar chart showing average width of keratinized gingiva percentage change (%)-----	54

## List of Figures (cont.)

Figure	Title	Page
13.	Line chart showing average thickness of keratinized gingiva (mm)---	55
14.	Bar chart showing average PES -----	58
15.	Bar chart showing average clinical bone width (mm)-----	60
16.	Bar chart showing average clinical bone width percentage change (%)--	62
17.	Bar chart showing average Ostell measurements -----	69
18.	Line chart showing average Ostell measurements.-----	71
19.	Bar chart showing average ostell measurements percentage change (%)--- -----	72
20.	Scatter plot showing the correlation between clinical and radiographic bone width-----	73
21.	<b>a.</b> Preoperative frontal view of patient with non restorable two central incisors. <b>b.</b> Preoperative Occlusal view. <b>c.</b> Preoperative CBCT. <b>d.</b> Width of kG of right central incisor. <b>e.</b> Width of kG of left central incisor. <b>f.</b> After preparation of SS. <b>g.</b> Implants placed. <b>h.</b> Implant stability measurements by Ostell. <b>i.</b> Occlusal view after bone graft placed in left central incisor. <b>j.</b> Implant stability measured after 6 months. <b>k.</b> Sagittal cut preoperative and 6 months postoperative of upper right central. <b>l.</b> Sagittal cut preoperative and 6 months postoperative of upper left central. <b>m.</b> Customized zirconium abutments try in. <b>n.</b> Final zirconium crown screwed in place.-----	73

## **Review of Literature**

Alveolar bone volume and favorable architecture of the alveolar ridge are essential to obtain ideal functional and esthetic prosthetic reconstruction following implant therapy (*Schneider 1999*).

Loss of alveolar bone may occur prior to tooth extraction because of periodontal disease, peri-apical pathology, or trauma to teeth and bone. Damage of the bone tissues during tooth extraction procedures may also result in bone loss. Finally, alveolar bone atrophy after tooth extraction is a well-known phenomenon (*Lekovic et al., 1998*).

The tooth is anchored to the jaws via the bundle bone into which the periodontal ligament fibers invest. The shape as well as the volume of the alveolar process is determined by the form of the teeth, their axis of eruption and eventual inclination (*Tallgren, 1972*).

The bundle bone, is a tooth-dependent structure and consists of lamellar bone, has a thickness of 0.2–0.4 mm Schroeder HE (1986). In the anterior maxilla the facial bone wall thickness has been shown to be less than 1 mm in 90% of cases and less than 0.5 mm in almost 50% of cases (*Braut et al., 2011; Januario et al., 2011*).

After tooth loss or extraction, the bundle bone at the site loses its function and disappears. (*Botticelli et al. 2004; Araujo & Lindhe 2005*). This bundle bone loss leads to mostly horizontal bone loss and to a lesser extent vertical bone loss. In a study done by Lekovic and colleagues, they compared the use of bio-absorbable membrane versus no intervention after extraction of a tooth. A significant decrease in the average internal vertical measurements was detected at 6 months when compared to baseline ( $1.06 \pm 0.17$  versus  $6.88 \pm 0.29$  mm, respectively) as well as a significant decrease in the horizontal measurements ( $6.06 \pm 0.17$  versus  $7.38 \pm 0.24$  mm, respectively) (*Lekovic et al. 1997, Araujo & Lindhe 2005*).

The mid-facial recession of an immediate implant placed into an extraction socket has been reported to be 0.55 to 0.75 mm at 1 year of follow-up (*De Rouck et al., 2008*). In posterior sites, the objective of implant therapy is restoring function of chewing. In anterior sites, however, the esthetic appearance is equally important to restore. Ideally, successful implant-supported restorations should imitate natural teeth appearance (*Belser et al., 2004*). The peri-implant soft tissue condition appears to be the critical determinant (*Garber 1996*).

*Araujo & Lindhe., 2009* described the physiologic alveolar socket healing into three phases, the inflammatory phase that begins with the formation of the blood clot. During the 2-3 days following extraction, inflammatory cells migrate to the site to decontaminate it before the formation of a new tissue. The combination of inflammatory cells, vascular sprouts and immature fibroblasts forms a granulation tissue after 4 to 5 days. Which is gradually replaced with connective tissue matrix that is rich in collagen fibers and cells. The proliferative phase is characterized by rapid tissue formation. There is an appearance of osteoid calcification, which begins at the periphery and at the base of the socket. The bone matrix appears very early towards the second week of healing, and is replaced by mature bone tissue. Bone filling occurs between 5th to 10th week and it is completed after 16 weeks. Complete epithelial closure of the socket takes place after 4 to 5 weeks.

Bone modeling and remodeling phase: Bone modeling is defined as change in the shape and architecture of the bone. Assessment of residual bone quality and quantity is a key determinant of success to restore esthetics by implant placement. The alveolar bone atrophy occurring at buccal aspect is proven to be more significant than lingual or palatal aspects of jaws (*Pietrokovski & Massler 1967*).