

The Effect of Injectable PRF Mixed with Composite Bone Graft in Immediate Implant Placement; Randomized Clinical Trial

Thesis

*Submitted to Oral Medicine, Periodontology and Oral
Diagnosis Department, Faculty of Dentistry, Ain Shams
University, for partial fulfillment of the requirements for
Master's Degree in Oral Medicine, Periodontology and Oral
Diagnosis*

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B.D.S. 2012

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2019

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا أنك لا تعلم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

*First and foremost, I feel always indebted to **ALLAH**, the Most Kind and Most Merciful.*

I would like to extend my sincerest thanks and appreciation to those patient souls who helped me to accomplish this study. I would like to extend my gratitude to all of the faculty and staff in the Department of Oral Medicine, Periodontology and Oral Diagnosis, Faculty of Dentistry, Ain Shams University and special recognition goes to the following beloved individuals:

***Prof. Dr. Khaled Abd El-Ghaffar**, Professor of Oral Medicine, Periodontology and Oral Diagnosis, Minister of Higher Education and Scientific Research, for his dedication to his work and for devoting his time to guide me and simplifying all the problems I have faced in this study.*

***Dr. Fatma Hamed El-Demerdash**, Lecturer of Oral Medicine, Periodontology and Oral Diagnosis, Faculty of Dentistry, Ain-Shams University for her generous collaboration, effort and time invested in this study. It is deeply appreciated.*

*My sincere thanks also go to **Prof. Dr. Ahmed Gamal and Dr. Ahmed Abdulaziz**, for keeping their doors open and give me all the help and encouragement that they can. It is really treasured.*

Finally, to get to know you were the most beautiful experience I have ever had, and for that I am eternally thankful to all and every one of you.

Mohammed Omar

Dedication

*This manuscript is dedicated to all of the people who have supported and encouraged me throughout my life. To **my mother and father**, I am eternally grateful for the sacrifices that you both endured to allow me to pursue my goals. None of this would have been possible without your guidance, love, and support. Thanks to **my aunt and my grandmother** for your unconditional support and encouragement. Thank you all for your never-ending love and support and for the joy that you bring to each day of my life. I love each and every one of you and I am eternally grateful to have such a wonderful family. Special thanks to **my dear friends** for much support through these years. Last but not least, I would like to dedicate this project to **my injured country (Yemen) and to my second home (Egypt)** the place where I spent three amazing years that I will never forget.*

List of Contents

Title	Page No.
List of Tables	i
List of Figures	ii
List of Abbreviations.....	v
Introduction	1
Review of Literature	10
Aim of the Study	68
Materials and Methods	69
Results.....	85
Case Presentation	102
Discussion.....	121
Conclusion	128
Recommendations	129
Summary.....	130
References	132
Arabic Summary	

List of Tables

Table No.	Title	Page No.
Table (1):	PES index	78
Table (2):	Age distribution of the studied groups	85
Table (3):	Sex distribution of the studied groups	86
Table (4):	Distribution of the studied groups according to tooth position	87
Table (5):	Distribution of the studied groups according to pre and post-operative gingival biotype	88
Table (6):	The Pink Esthetic score assessment of the studied groups.....	89
Table (7):	The detailed values of the Pink Esthetic score for the studied groups	91
Table (8):	Radiographic total horizontal evaluation at baseline compared to that after 6 months of implantation and ridge alteration	94
Table (9):	Radiographic vertical evaluation at baseline compared to that after 6 months of implantation and ridge alteration	96
Table (10):	Radiographic bone density at baseline compared to that after 6 months of implantation in both groups	98
Table (11):	The rate of success of implantation in the studied groups.....	101

List of Figures

Fig. No.	Title	Page No.
Figure (1):	PES score assessment .	78
Figure (2):	Land marker.	80
Figure (3):	Horizontal evaluation technique.	81
Figure (4):	Vertical evaluation technique.	82
Figure (5):	Bone density evaluation technique.	83
Figure (6):	The mean age among the studied groups.	85
Figure (7):	Sex distribution among the studied groups.	86
Figure (8):	Sex distribution among the studied groups.	87
Figure (9):	Gingival biotype among the studied groups.	88
Figure (10):	The pink esthetic score assessment among the studied groups.	90
Figure (11):	Items of the Pink Esthetic score among the studied groups.	92
Figure (12):	Radiographic total horizontal evaluation at baseline compared to that after 6 months of implantation in group A.	94
Figure (13):	Radiographic total horizontal evaluation at baseline compared to that after 6 months of implantation in group B.	95
Figure (14):	Radiographic ridge alteration for horizontal evaluation in group A versus group B.	95
Figure (15):	Radiographic vertical evaluation at baseline compared to that after 6 months of implantation in group A.	97

List of Figures (Cont...)

Fig. No.	Title	Page No.
Figure (16):	Radiographic vertical evaluation at baseline compared to that after 6 months of implantation in group B.....	97
Figure (17):	Radiographic ridge alteration for vertical evaluation in group A versus group B.	97
Figure (18):	Radiographic bone density evaluation in group A ...	99
Figure (19):	Radiographic bone density evaluation in group B ...	99
Figure (20):	Radiographic bone density evaluation in studied groups.....	100
Figure (21):	The rate of successful tooth implantation in both groups.....	101
Figure (22):	Case 1	102
Figure (23):	Case 2	106
Figure (24):	Prosthetic Steps.....	110
Figure (25):	Horizontal evaluation of control case.....	113
Figure (26):	Vertical evaluation of control case	113
Figure (27):	Bone density of control case	114
Figure (28):	Horizontal evaluation of control case.....	115
Figure (29):	Vertical evaluation of control case.....	115
Figure (30):	Bone density of control case	116
Figure (31):	Horizontal evaluation of study case.....	117
Figure (32):	Vertical evaluation of study case.	117
Figure (33):	Bone density of study case	118

List of Figures (Cont...)

Fig. No.	Title	Page No.
Figure (34):	Horizontal evaluation of study case.....	119
Figure (35):	Vertical evaluation of study case.	119
Figure (36):	Bone density of study case	120

List of Abbreviations

Abb.	Full term
<i>ABB</i>	<i>Anorganic Bovine Bone</i>
<i>ALP</i>	<i>Alkaline Phosphatase</i>
<i>A-PRF</i>	<i>Advanced Platelet Rich Fibrin</i>
<i>ASA</i>	<i>American Association of Anesthesiologists</i>
<i>BCP</i>	<i>Biphasic Calcium Phosphate</i>
<i>BIC</i>	<i>Bone To Implant Contact</i>
<i>BMP</i>	<i>Bone Morphogenic Protein</i>
<i>BPBM</i>	<i>Bovine Porous Bone Mineral</i>
<i>CAL</i>	<i>Clinical Attachment Loss</i>
<i>CaP</i>	<i>Calcium Phosphate</i>
<i>CBCT</i>	<i>Cone Beam Computed Tomography</i>
<i>CHA</i>	<i>Carbonate Hydroxyapatite</i>
<i>DBBM</i>	<i>Deproteinized Bovine Bone Mineral</i>
<i>EGF</i>	<i>Epidermal Growth Factor</i>
<i>FDBA</i>	<i>Freeze-Dried Bone Allograft</i>
<i>FDP</i>	<i>Fibrinogen Degradation Products</i>
<i>FGF</i>	<i>Fibroblast Growth Factor</i>
<i>GB</i>	<i>Gingival Biotype</i>
<i>GBR</i>	<i>Guided Bone Regeneration</i>
<i>GF</i>	<i>Growth Factors</i>
<i>GTR</i>	<i>Guided Tissue Regeneration</i>
<i>HA</i>	<i>Hydroxyapatite</i>
<i>HDD</i>	<i>Horizontal defect dimension</i>
<i>HEMA</i>	<i>Hydroxyethylmethacrylate</i>
<i>HG</i>	<i>Horizontal Gap</i>
<i>HGF</i>	<i>Hepatocyte Growth Factor</i>
<i>HU</i>	<i>Hounsfield unit</i>
<i>IGF</i>	<i>Insulin-like Growth Factor</i>
<i>IIP</i>	<i>Immediate Implant Placement</i>

List of Abbreviations (Cont...)

Abb.	Full term
<i>i-PRF</i>	<i>Injectable Platelet Rich Fibrin</i>
<i>LBP</i>	<i>Labial Bone Plate</i>
<i>MMP-8</i>	<i>Matrix Metalloproteinase's -8</i>
<i>MMP-9</i>	<i>Matrix Metalloproteinase's -9</i>
<i>MSCs</i>	<i>Mesenchymal Stem Cells</i>
<i>NBR</i>	<i>Natural Bone Regeneration</i>
<i>OFD</i>	<i>Open Flap Debridement</i>
<i>PC</i>	<i>Platelet concentrates</i>
<i>PDGF</i>	<i>Platelet-Derived Growth Factor</i>
<i>PES</i>	<i>Pink esthetic score</i>
<i>PMMA</i>	<i>Polymethylmethacrylate</i>
<i>PPD</i>	<i>Probing Pocket Depths</i>
<i>PRF</i>	<i>Platelet Rich Fibrin</i>
<i>PRGF</i>	<i>Platelet Rich in Growth Factors</i>
<i>PRP</i>	<i>Platelet rich Plasma</i>
<i>SBS</i>	<i>Synthetic Bone Substitute</i>
<i>TGF</i>	<i>Transforming Growth Factor</i>
<i>T-PRF</i>	<i>Titanium Platelet Rich Fibrin</i>
<i>VEGF</i>	<i>Vascular Endothelial Growth Factor</i>
<i>α-TCP</i>	<i>Alpha Tricalcium Phosphate</i>
<i>β-TCP</i>	<i>Beta Tricalcium Phosphate</i>

INTRODUCTION

Wound healing in post extraction socket is a distinctive process as resorption follows which may lead to many prosthetic difficulties regarding the replacement of a tooth. Extraction socket is characterized by marked bone loss of the socket bony wall in the horizontal plane, which is also escorted by loss of vertical height, the majority of this bone loss occurs during the first year after extraction, and one third of this total bone loss occurs during the first three months. For this reason, applying socket augmentation to preserve the socket immediately after tooth extraction is recommended and has a great result on the functional and aesthetic outcomes (*Guglielmotti, 1985; Cardaropoli et al., 2003; Hayacibara et al., 2005; Trombelli et al., 2008; Clementini, 2013*).

Immediate implant placement in the post extraction socket has given implant dentistry the opportunity to ascertain preferable and faster functional results, this approach is a routine surgical procedure that has been utilized since 1980s. Immediate implant placement is referred to the placement of an implant into a tooth socket concurrently with the extraction. With this procedure the number of surgical procedures a patient would undergo are markedly reduced as well as the overall treatment time as the socket healing and implant osseointegration occur concurrently (*Wagenberg and Ginsburg, 2001; Chen et al., 2009; Khzam et al., 2015*).

Many recent studies have focused on treatment outcome of implant therapy performed in the esthetic zone. Placement of dental implant in the esthetic zone is a technique sensitive procedure with little room of error. Yet

challenge remains in many cases. Inadequate bone availability for implant placement and optimal esthetic outcomes are common issue facing clinicians. However, immediate implant with certain cases cannot be placed and hard and/or soft tissue augmentation is required first so that optimum aesthetics can be achieved (*Al-Sabbagh 2006; Jivraj and Chee, 2006*).

One of the problems that might be encountered with immediate implantation is the unpredictable aesthetic outcome. The residual labial bone plate (LBP), although it might be present and intact at the time of tooth extraction, will be subjected to bone remodeling whose ultimate outcome is difficult to portend because of the great individual variability. This can result, in some instances to a poor aesthetic outcome which is of a great concern for some patients. To overcome such problem, special attention should be paid to the horizontal gap that might exist between the implant and the bony socket walls. A lot of studies have showed that filling of the gap with bone substitutes might modify the pattern of hard tissue modeling (*Pietrokovski and Massler, 1967; Quirynen et al., 2007; Qahash et al., 2008; Barone et al., 2011; Bashara et al., 2012; Degidi et al., 2012*).

To promote tissue regeneration growth factors have been used as therapeutic agent because of their expression during different phases of tissue healing. The osseointegration of dental implant can be improved and accelerated by increasing the regenerative capacity of surrounding tissues with appropriate stimuli (*Anitua et al., 2006; DuRaine et al., 2011*).

In 1972 fibrin glue had been used for nerve repair. This glue depended on concentration source of human fibrinogen. In 1980s was found the importance of platelet as a source of autologous growth factors

that stimulate angiogenesis, collagen synthesis and cell migration and proliferation. For long time it has been known that fibrin clot and platelets have haemostatic and tissue repairing effect (*Knighton et al. 1986; Marx et al. 1998; Ness 1990*).

Whitman et al., described autologous concentration of human platelets contained in small volume of plasma called, Platelet-rich plasma (PRP), platelet-rich concentrate and autologous platelet gel which consequently had been used instead of fibrin glue (*Whitman et al., 1997*). A minor variation of PRP was developed by *Anitua et al., in 1999* which have no white blood cells and completely autologous called Plasma rich in growth factor (PRGF) (*Anitua et al., 1999*).

A second-generation platelet concentrate has been developed in France by *Choukroun* called Platelet Rich Fibrin (PRF). This technique requires neither anticoagulant nor bovine thrombin compared to cPRP (concentrated Platelet-rich plasma) (*Dohan et al., 2006*). Recently a new protocol has been developed by Choukroun during the Syfac (International Symposium on Growth Factors) meeting in Paris, injectable Platelet rich fibrin (i-PRF) a liquid and injectable with no anticoagulant neither an additive (*Choukroun, 2014*).

This study focused upon the effect of i-PRF when mixed with bone graft on the buccal bone plate thickness around immediate implant placement.