

Socket Augmentation Using Platelet Rich Fibrin Versus Xenogeneic Graft Clinical and Radiological Assessment

*Thesis submitted for partial fulfillment of the requirements
for Master Degree in Oral and Maxillofacial Surgery*

Presented by

Mohammed Ahmad Ashour

B.D.S. (2009)

Kalamoon University

Supervisors

Marwa Abdalwahab El-kassaby

Associate Professor in Oral and Maxillofacial Surgery Department

Faculty of Dentistry, Ain-shams University

Mustafa Mohammed Sayed Taha

Lecturer in Oral and Maxillofacial Surgery Department

Faculty of Dentistry, Ain-shams University

Faculty of Dentistry

Ain-Shams University

2016

“This thesis was a part of a clinical project to assess the effect platelet rich fibrin to preserve alveolar ridge dimension after tooth extraction in the esthetic zone, the assessment of the effect of platelet rich fibrin on bone formation and primary implant stability after three and six months.

This project included thesis of dear colleagues Muhammad Sayed Rashad “Assessment of Primary Stability of Implants Inserted into Sockets Augmented with Anorganic Bovine Bone Mineral or Platelet Rich Fibrin” and Rasha Essa “Histological analysis of bone healing after socket augmentation using platelet rich fibrin versus xenogenic bone graft”

This thesis is dedicated to :

My great teacher and messenger, Mohammed (May Allah bless and grant him), who taught us the purpose of life.....

My homeland Syria....

My second homeland Egypt....

My great parents, who never stop giving of themselves in countless ways...

My dearest wife, who leads me through the valley of darkness with light of hope and support..

My beloved kids: Louna, and Ahmad, whom I can't force myself to stop loving.

My beloved brother and sisters; particularly my dearest sister, Marwa, who stands by me when things look bleak.

To number of people without whom this thesis might not have been written Professor Salah Abdel-fatah Dr Ayman Othman, and Abd alrahman Al-qoraby whose I am greatly indebted.

To all my family, the symbol of love and giving particularly Mohammed Aldahaoool and Dr.Mayson othman .

My friends who encourage and support me, Yasser el Hadidi, Akram El-Shama'a ,Ahmad Nabil and Zaher barbor.

Last but not least, A special gratitude to my supervisor Professor Marwa Abdalwahab El-kassaby, for your critical eye and constructive criticism, your optimistic attitude and encouragement, and understanding to my situation has been invaluable during the process of writing this thesis until the end.

All the people in my life who touch my heart ‘

I dedicate this research.

Disclosure of Interest:

This study was self-funded by the primary investigators of the socket augmentation project (Mohammed Ashour, Muhammad Sayed Rashad, and Rasha Essa) with no conflict of interest. No financial support or free samples of any kind from Geistlich Pharma and Biohorizon Inc.

Acknowledgment:

I would like to express my special thanks and gratitude to

- Dr. Mustafa Mohammed Sayed Taha (Lecturer in Oral and Maxillofacial Surgery Department Faculty of Dentistry, Ain-shams University) and Dr. Karim Mohsen (Lecturer in Oral and Maxillofacial Surgery Department Faculty of Dentistry, Ain-shams University) for their clinical and technical support through this thesis.
- Mr. Amr El Tohamy for his technical assistance in the radiographical evaluation of the patients.
- Dear colleagues Yasser el Hadidi (Associate Lecturer in the Oral and Maxillofacial Surgery Department Faculty of Dentistry, Ain-shams University) and Akram El-Shama'a (Post-graduate student in the Oral and Maxillofacial Surgery Department Faculty of Dentistry, Ain-shams University) for their technical help in writing and editing of this thesis.
- Last, but not the least the socket augmentation project team (Muhammad Sayed Rashad, and Rasha Essa) for valuable co-operation in conducting this research.

List of Contents:

-	Review of literature.....	1
-	Aim of Study	30
-	Material and Methods	32
-	Results	53
-	Discussion.....	70
-	Summary, Conclusion and Recommendation...81	
-	References.....	84
-	Arabic summary.....	

List of abbreviations:

- **RAP:** Regional Acceleratory Phenomenon.
- **MSCs:** Mesenchymal Stem Cells.
- **ARP:** Alveolar Ridge Preservation.
- **DFDBA:** Demineralized Freeze Dried Allograft.
- **FDBA:** Freeze Dried Allograft.
- **PBBM:** Porous Bovine Bone Mineral.
- **GTR:** Guided Tissue Regeneration.
- **HA:** Hydroxyapatite.
- **TCP:** Tricalcium Phosphate.
- **ePTFE:** expanded Polytetrafluoroethylene.
- **ITI:** International Team for Implantology.
- **GFs:** Growth factors.
- **TGF β :** Transforming Growth Factor- β .
- **IGF-I:** Insulin Growth Factor-I.
- **PDGF:** Platelet Derived Growth Factor.
- **VEGF:** Vascular Endothelial Growth Factor.
- **FGF:** Fibroblast Growth Factor.
- **EGF:** Epidermal Growth Factor.
- **HGF:** Hepatocyte Growth Factor.
- **BMP:** Bone Morphogenic.
- **CTGF:** Connective Tissue Growth Factor.
- **PRP:** Platelets Rich Plasma.

- **PRF:** Platelets Rich Fibrin.
- **CBCT:** Cone Beam Computed Tomography.
- **RCTs:** Randomize clinical trials.

List of figures

Figure 1 Non restorable upper right central incisor.	36
Figure 2: Atraumatic extractions with periotome	36
Figure 3: Dental forceps used to grasp and remove the tooth.....	36
Figure 4: withdrawal of blood sample.	37
Figure 5: vacuum plain blood collection tube.....	37
Figure 6: Showing three layers formed after centrifugation process.	38
Figure 7: Macroscopic image of the PRF.	38
Figure 8: PRF packed in the socket and suturing.	39
Figure 9: Xenograft in the extraction socket to the bone level.	39
Figure 10: Collagen plug in place.....	40
Figure 11: Plug stabilized by suturing.	40
Figure 12: Approximated soft tissue margins without any graft material.	40
Figure 13: follow up time line.	41
Figure 14: Follow up after one week.	42
Figure 15: Follow up after three months.....	43
Figure 16: Crestal incision with full thickness flap reflected.	43
Figure 17: Complete osteotomy preparation.....	43
Figure 18 Implant insertion to the Crestal bone level.....	44
Figure 19: Cover screw inserted in place.....	44
Figure 20: The flap repositioned and sutured.	44
Figure 21 Acrylic stent with radiopaque marker	46
Figure 22:Acrylic stent put in place after extraction phase 1	47
Figure 23: Vertical clinical measurement was taken after tooth extraction from mid-buccal and mid-palatal alveolar crest points to the reference point of acrylic stent.....	47

Figure 24: Horizontal clinical measurement was taken after tooth extraction from mid-buccal to mid-palatal alveolar crest points	47
Figure 25: Vertical clinical measurement was taken before implant placement (phase2)	48
Figure 26: Horizontal clinical measurement was taken before implant placement.	48
Figure 27: Selected three different points for auto- superimposition	49
Figure 28: Manual editing of superimposition.....	49
Figure 29: Vertical bone loss measurements.	50
Figure 30: Horizontal bone loss measurements.	51
Figure 31: Buccal plate thickness measurement.	52
Figure 32 Bar chart showing difference in vertical and horizontal bone loss between three and six months in millimeter	58
Figure 33 Bar chart showing difference in vertical and horizontal bone loss between Xenograf, PRF, and control group in millimeter	60
Figure 34: Bar chart showing difference in palatal bone loss between the three groups after three months of tooth extraction.	61
Figure 35: Bar chart showing difference in buccal bone loss between the three groups after three months of tooth extraction.	62
Figure 36: Bar chart showing difference in horizontal bone loss between the three groups after three months of tooth extraction.	63
Figure 37: Bar chart showing difference in palatal bone loss between the three groups after six months of tooth extraction.	64
Figure 38 Bar chart showing difference in buccal bone loss between the three groups after six months of tooth extraction.	65
Figure 39 Bar chart showing difference in horizontal bone loss between the three groups after six months of tooth extraction.	66

Figure 40 Bar chart showering the effect of preliminarily (post-extraction) buccal cortex thickness on vertical and horizontal bone loss:	68
---	----

List of tables:

Table 1: Tooth Position According to Treatment Performed.	54
Table 2: Correlation between clinical and radiographic measurements:.....	57
Table 3: Comparison of vertical and horizontal bone loss after 3 and 6 months of tooth extraction.	58
Table 4: Vertical and horizontal bone loss in three groups	59
Table 5: Palatal bone loss of three groups after three months.	61
Table 6 Buccal bone loss of three groups after 3 months	62
Table 7Horizontal bone loss of three groups after 3 months	63
Table 8 Palatal bone loss of three groups after 6 months	64
Table 9 Buccal bone loss of three groups after 6 months	65
Table 10: Horizontal bone loss of three groups after 6 months	66
Table 11: Effect of buccal cortex thickness on vertical and horizontal bone loss.....	67
Table 12: Buccal plate thickness distribution among treatment groups.....	68