The effect of Platelet Rich Fibrin on the Healing of Autogenous Bone Grafts in Mandibular Reconstruction

Thesis submitted to the Faculty of Oral and Dental Medicine, Cairo University in Partial Fulfillment of the Requirements for The Doctor Degree in Oral and Maxillofacial Surgery

By

Abdullah Hassan Thabet Farhan

B.D.S (Sana'a University) 2003

M.D.S (Cairo University) 2009

Lecturer of Oral and Maxillofacial Surgery

Faculty of Oral and Dental Medicine, Sana'a University

Oral and Maxillofacial Surgery Department

Faculty of Oral and Dental Medicine

Cairo University

-2013-

SUPERVISORS

Professor Dr / Galal Beheri
Professor of Oral and Maxillofacial Surgery
Faculty of Oral and Dental Medicine
Cairo University

Dr/ Tareq Al Ghareb
Lecturer of Oral and Maxillofacial Surgery
Faculty of Oral and Dental Medicine
Cairo University

بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

((وعلمك ما لم تكن تعلم وكان فضل الله عليك عظيماً))

صدق الله العظيم

سورة النساء الاية 113

Acknowledgment

Words fail to express my feeling of gratitude and deep appreciation to **Professor. Dr. Mohammed GalaL Beheri**, Professor of Oral and Maxillofacial Surgery, Oral and Maxillofacial Surgery department, Faculty of Oral and Dental Medicine, Cairo University, for his support, continuous teaching and fatherly guidance during this study.

Also the words are not enough to express my sincere appreciation and genuine gratitude to **Dr. Tareq Al ghareb** , Lecturer of Oral and Maxillofacial Surgery, Oral and Maxillofacial Surgery department, Faculty of Oral and Dental Medicine, Cairo University, for her patience and beneficial advice and continuous constructive supervision throughout the whole study.

My thanks extend to all staff and members of oral and maxillofacial surgery department, Faculty of Oral and Dental Medicine, Cairo University, for their considerable cooperation, kind feeling and supports.

Dedication

To my big family, my father, my mother and brothers and sisters and to my small family, my dear wife and my kids for being so patient and supportive during my study.

Table of contents

List of Tables

List of figures

List of abbreviations

AIS	Anterior iliac spine
BMP	Bone morphogenetic protein
CBCT	Cone beam computed tomography
CT	computed tomography
FEA	Fine element analysis
FGF	Fibroblast growth factor
FGFR	Fibroblast growth factor receptor
GDFs	Growth and differentiation factors
IL	Interleukin
IGF	Insulin growth factor
MRI	Magnetic reasoning imaging
MSCs	Mesechymal stem cells
PDGF	Platelet derived growth factors
PRF	Platelet rich fibrin
PRP	Platelet rich plasma
TGF	Transforming growth factor
TNF	Tumor necrosis factor

Introduction

The need for reconstruction of body defects is an essential rule of any heath care providers especially surgeons and it has evolved through the late years of the 19th century and the beginning of the 20th century driven by the challenges of wars and assisted by the general advancement in the medical field through years.

The goal of any reconstructive surgery is to replace bone and soft tissue loss in such a fashion that function and esthetics approach their preablative levels. In so doing, the benefits of surgical reconstruction should equal or surpass the patient's quality of life without the reconstruction and avoid complications and deformities that may reduce their quality of life(1).

Reconstruction of the jaws because of trauma or congenital defects or after removal of pathological lesions poses a challenge to the oral and maxillofacial surgeons because of the complex anatomy of the area and the functional requirements that must be satisfied(2).

There are three important factors that play a role in the overall success of any reconstruction in the jaws. First, rigid fixation of the graft Second, adequate soft tissue to guarantee coverage and good blood supply, Third, the volume and contour of the reconstructed bone should mimic the original or desired volume and contour of the resected or missing part as close as possible(3).

Bone as a tissue has the capacity of postnatal self-reconstruction, in small defects bone can heel without the need of any grafts. However, with large defects To restore structural and functional integrity, either autografts or allogenic bone are required.[4]

Bone heals in a complex cascade of biological events, regulated by specific cells, the extracellular matrix and distinct growth factors .So bone healing process may be further stimulated and supported by the biomechanical delivery of growth factors that have a role in its healing for a longer period and higher concentrations[5] .

Platelets contains a variety of growth factors that plays a rule in bone healing Several technique since Ross et al[6] has shown the ability and the efficacy to use this growth factors to augment tissue healing has been developed to directely deliver this growth factors into the required sites .

At the beginning of 2006 chockroun et al[7] developed a method to concentrate and deliver those growth factors and called it platelet rich fibrin the major benefits of this new method beside that it gives us the growth factors in the form of membrane which can be adapted directly on the bone graft, it is very simple in preparation, non time consuming and it is a reproducible method.

This thesis will examine the effect of the platelet rich fibrin on the healing of corticocancellous bone grafts in reconstruction of the mandible.