Cairo University
Faculty of Veterinary Medicine
Department of Surgery, Anesthesiology and Radiology.

THE ROLE OF PLATELET RICH PLASMA (PRP) IN FEMORAL BONE DEFECT HEALING IN DOGS: AN EXPERIMENTAL STUDY

Thesis presented
By

MOHAMED SAMIR SAYED
(B. V. Sc. 2011)
For the degree of M.V.Sc.
(Surgery, Anesthesiology and Radiology Department)

Under the supervision of:

Prof. Dr. AHMED SAYED AHMED
Professor of Surgery, Anesthesiology and Radiology Department
Faculty of Veterinary Medicine, Cairo University

Dr. ELHAM ABD ELGAWAD HASSAN

Ass. Professor of Surgery, Anaesth.& Radiology
Faculty of Veterinary Medicine
Cairo University

Dr. MOKHTAR HANAFY GAD

Professor of Histology,
Faculty of Veterinary Medicine
Cairo University

2017

Abstract

Cairo University.

Faculty of Veterinary Medicine.

Department of Surgery, Anaesthesiology & Radiology.

Name: Mohamed Samir Sayed.

Nationality: Egyptian.

Date of birth: 23/6/1989.

Place of birth: El-qalubia.

Degree: M.V.Sc.

Specification: Surgery, Anesthesiology and Radiology.

Title of the thesis: The Role of Platelet Rich Plasma (PRP) in Femoral Bone Defects Healing in Dogs: An Experimental Study

Supervisors:

-Prof. Dr. Ahmed Sayed Ahmed.

Prof. of surgery, Anesthesiology & Radiology, Faculty of veterinary Medicine, Cairo University.

-Dr. Elham Abd Elgawad Hassan.

Ass. Prof. of Surgery, Anaesthesiology & Radiology, Faculty of Veterinary Medicine, Cairo University.

-Prof. Dr. Mokhtar Hanafy Gad.

Prof. of Histology, Faculty of veterinary Medicine, Cairo University.

Abstract:

To evaluate the effect of autologous platelet rich plasma (PRP) for healing of femoral bone defect in dogs.

Twenty four adult mongrel dogs was used in this study, a 2-cm cortical segment of the right Femur was osteotectomized, and then fixed with an 8-hole Dynamic-Compression Plate. The animals were divided into two groups; group A (n=12) control group and group B (n=12) PRP group. All dogs were euthanized at 2, 4, 8 and 12 weeks. The operated femurs were harvested and the implantation site were assessed for bone healing by clinical, radiographical and histological examinations.

It was found that, osteoid bridging the gap at femur defect was noted in all specimens in the PRP groups at week 8 &12 while, in control group there was a minimal periosteal reaction at the bony edges of the defect.

In conclusion PRP increased bone healing at early stage.

Acknowledgement

First of all prayerful thanks to ***Allah*** *who gave me the strength, power and endurance to finish this work and everything I have.*

I wish to express my deepest thanks and gratitude to ***Prof. Dr. Ahmed S. Ahmed*** *professor of Surgery, anesthesiology and radiology department, Faculty of Veterinary Medicine, Cairo University for his supervision, kind encouragement, valuable guidance and continuous interest which are responsible for the completion of this work.*

A lot of thanks to ***Dr. Elham A. Hassan*** *Assistant Professor of Surgery, anesthesiology and radiology , faculty of Veterinary Medicine, Cairo University for her supervision, indispensable support, sincere cooperation, wrathful advices and generous help throughout the work.*

I wish to express my deepest thanks and gratitude to ***Prof. Dr. Mokhtar H.Gad*** *professor of histology department, Faculty of Veterinary Medicine, Cairo University for his kind help and valuable guidance.*

Great thanks for my friend and brother ***Dr. Ahmed Nour*** *for his help and guidance.*

I would also like to thank all my ***professors, colleagues and workmen*** *in the department of Surgery, anesthesiology and radiology for their help and willing assistance cooperation.*

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List of abbreviations	
LBD	Long Bone Defect.
FG	Fracture Gap.
kVp	Kilovoltage Potential.
mAs	Milliampere seconds.
F.F.D.	Focal spot Film Distance.
ASIF	Association for the Study of Internal Fixation.
DCP	Dynamic compression plate
P.O	Post-operatively.
S/C	Sub- Cutaneous.
I/V	Intravenously.
PRP	Platelet Rich Plasma
PDGF	Platelet derived growth factor.
TGF	Transforming growth factor.
IGF	Insulin like growth factor.
EGF	Epidermal growth factor.
VEGF	Vascular endothelial growth factor.
TCP	Tricalciumphosphate
BMP	Bone Morphogenic Protein.
MSC	Mesenchymal stem cell
IL	Interleukin
TNFα	Tumor necrosis factor α
MCSF	Macrophage colony stimulating factor
WB	Whole blood
PPP	Platelet poor plasma
P-PRP	Pure platelet rich plasna
L-PRP	Leucocyte platelet rich plasma
PF-4	Platelet factor-4

HGF	Hepatocyte growth factor
GPS	Gravitational platelet sequestration
EDETA	Ethylene di amine tetra acetic acid
CPD	Citrate phosphate dextrose
CTAD	Citrate theophylline adenosine diprimadole
RCF	Rotational centrifugation force
BMAC	Bone marrow aspiration concentrate
ACD-A	Acid citrate dextrose-A
PRF	Platelet rich fibrin
FGF	Fibroblast growth factor
ELISA	Enzyme linked immunosorbant assy
CGF	Concentrated growth factor

INTRODUCTION

A comprehensive knowledge of fracture healing is desirable in improving treatment and management of bone fractures and defects. Although medical technologies and orthopaedic surgical techniques have been much improved, some fractures still heal poorly, others take a long time to heal (delayed unions) and some result in non-unions **(Hokugo *et al.*, 2005).** Thus, there remains a need to know more about the biology of fracture healing in order to develop strategies for ensuring normal repair of the skeleton **(Jeong *et al.*, 2013).**

Many factors which in terms of compound and complicated fractures, bone tumors (e.g. osteosarcoma), necrosis, severe osteomyelitis, advanced osteoarthritis, high energy trauma, and other pathologic diseases can be the initial cause of bone defects, in most cases, it is often necessary to stabilize the remained viable bony segments and remove the diseased bony fragments that have no proper vascular supply from the patient's body **(Bigham *et al.*, 2008).** Following orthopedic surgical interventions, it is likely that large bone defects (LBDs) are developed **(Bostrom, Saleh, Einhorn, 1999).** Moreover, extensive fibrocartilage tissue formation following self-healing reaction may lead to development of delayed unions or non-unions in 5–10% of cases **(Schmitz and Hollinger, 1986).**

Successful healing of large bone defects (LBDs) is a complicated phenomenon because the body's natural ability often fails to effectively repair the LBDs. The characteristic of callus repair of fracture as well as the processes that take place during the healing of the injured tissues are of paramount importance when we consider the speed and quality of bone repair and its prognosis **(Sarkar *et al.*, 2006).**

The goal of fracture healing is to regenerate mineralized tissue in the fracture site in order to approximate the intact bone, and to restore mechanical strength and integrity of the injured bone to normalize the functionality of the repaired tissue **(Marsell and Einhorn, 2011)**.