Palatal Wound Healing Evaluation After Application of Platelet Rich Fibrin Versus 0.2% Hyaluronic Acid Dressings (Randomized Controlled Clinical Trial)

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By

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Dedication

To my Brother whom I miss every single day,

Beloved Family and Friends

Acknowledgment

*After thanking **Allah Almighty** for his countless blessings.*

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List of Abbreviation

a-PRF =Advanced platelet rich fibrin

αvβ6= Integrin alpha 5 beta 6

ECM=Extracellular matrix

EGF =Epidermal growth factor

EGFR= Epidermal growth factor receptor

FGF= Fibroblast growth factor

FGG= Free gingival graft

GAGS = Glycoasaminoglycans

HA=Hyaluronic acid

HMW =High molecular weight

HMWHA =High molecular weight Hyaluronic acid

HYAL-1= Hyalurondase-1

HYAL-2= Hyalurondase-2

IGF=Insulin like growth factor

KDa = Kilo Dalton

LMWHA =Low molecular weight Hyaluronic acid

MMPs=Matrix metalloprotineases

PDGF=Platelet derived growth factor

PMNs=Polymorphonuclear leucocytes

PRF = Platelet Rich Fibrin

PRP = Platelet Rich Plasma

RBCs= Red Blood Cells

RCT=Randomized clinical trial

rpm=Revolutions per minute

SD= Standard Deviation

TGFβ-1=Transforming growth factor β-1

TIMPs=Tissue inhibitor of matrix metalloprotineases

VAS= Visual analogue scale

VEGF= Vascular endothelial growth factor

Introduction

&

Review of Literature

According to the glossary of periodontal terms a wound is "an injury to living tissue, a forcible interruption of the continuity of any tissue" the mechanism by which that wound closes is called wound healing (***Glossary of periodontal terms 2001 fourth edition***).

The general function of the wound healing process is to restore the integrity and function of the tissue. In tissues like skin and oral mucosa, wound healing involves a partly overlapping sequence of inflammation, tissue formation and tissue remodeling. During inflammation, hemostasis is restored and bacteria & debris are removed from the wound. The defect is closed by the formation of new tissues and wound contraction. Finally, tissue remodeling takes place during maturation of the newly formed tissues ***(Von Den Hoff et al.2006).***

Diverse cell types are sequentially recruited and activated in wound healing. These cells are the components of the immunological system (neutrophils, monocytes, lymphocytes, and dendritic cells), as well as endothelial cells, keratinocytes, and fibroblasts. Cell activation stimulates the regulation of the expression of numerous genes that control cell proliferation, differentiation, and

migration. The extracellular matrix also represents another important tissue component involved in wound healing ***(Gurtner et al. 2008).***

Neutrophils have always been thought to act as foot soldiers of the innate immune system, since they are the first cells to arrive at the injury site. They migrate to protect and defend the wound against infection. Neutrophils' migration typically increase up to 2 days after wounding, it then declines in the absence of infection. Neutrophils are eliminated via phagocytic engulfment by macrophages that are recruited at later stages. Macrophages play important roles in immune defense and in the development of the granulation tissue formation and angiogenesis (***Kolaczkowaska &Kuber 2013)***.

The formation of new tissue phase corresponds to the second stage of wound repair and occurs between 2 and 10 days after injury .This phase includes the migration and proliferation of epithelial cells, activation of myofibroblasts and proliferation of new capillaries into the newly formed tissues. This mechanism function all over the body after injury with specific variations in the oral cavity (***Gurtner et al. 2008***).

The oral cavity can act as a mirror reflecting the homeostasis or lack of it dictating health and disease status. In intraoral wounds, the wound healing process is faster than in the skin and generates less scar tissue, therefore; intraoral wounds are sometimes considered to be more similar to fetal wounds. The intraoral wound healing process is influenced by the presence of saliva and large numbers of bacteria. Saliva contains many growth factors such as epidermal growth factor (EGF), fibroblast growth factor (FGF), insulin and insulin like growth factor (IGF) ***(Von Den Hoff et al. 2006)***.

In spite of the minor differences between the healing of the skin and the oral cavity, both of them follow the same sequence of healing: hemostasis, inflammation, proliferation, and tissue remodeling which normally lasts from day 1 after injury to 28 days later. Hemostasis occurs within seconds with blood clot formation and different growth factor released into the tissues from platelets such as platelet derived growth factor (PDGF), FGF, and EGF. Hemostasis is estimated to last for 3 days, followed by inflammation stage in which different immune cells are recruited. Proliferation stage proceeds with angiogensis and collagen synthesis, this stage is estimated to end by day 10