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Role of Platelet Rich Fibrin Matrix

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Abstract

Platelet rich fibrin matrix, which is rich in growth factors, has been demonstrated to be beneficial in the treatment of non healing ulcers in recent research. Aim of this study is to evaluate the role of Platelet Rich Fibrin Matrix (PRFM) in wound management. In our study, after two session of Platelet Rich Fibrin Matrix (PRFM) application, the two third of the defect was cover with granulation tissues.

Keywords: Platelet Rich Fibrin Matrix (PRFM); Wound, Management.

INTRODUCTION

The chronic ulcers and other damaged wounds impose a huge economic, social and public health burden which is steadily increasing as the population ages. Platelet derived growth factors serve a key role in tissue remodelling including neovascularisation. For the past four decades, platelet rich plasma (PRP) has been used and investigated. Exogenously applied platelet gel and fibrin sealant made from PRP combined with thrombin and calcium chloride has been shown to improve wound healing, bone development, haemostasis and tissue sealing.[1] Platelet rich fibrin matrix, which is rich in growth factors, has been demonstrated to be beneficial in the treatment of non healing ulcers in recent research.[2] We employed platelet rich fibrin matrix (PRFM) to prompt wound healing.

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MATERIALS AND METHODS

After receiving departmental ethical committee permission, this study was done in the department of Plastic Surgery at a tertiary care centre in South India. The patient provided written informed consent. 24 year old male with no known co morbidities was involved in a road traffic accident. He had sustained left Type IIIc fracture of proximal tibia with Popliteal Artery injury. He underwent wound debridement and Illizarov fixation for lateral tibia plateau in Orthopedics department. The patient now presents to the plastic surgery department with a non healing wound and exposed bone on the left proximal part of leg (Fig. 1). Multiple debridements were performed, and STSG was applied to the raw regions in multiple settings.

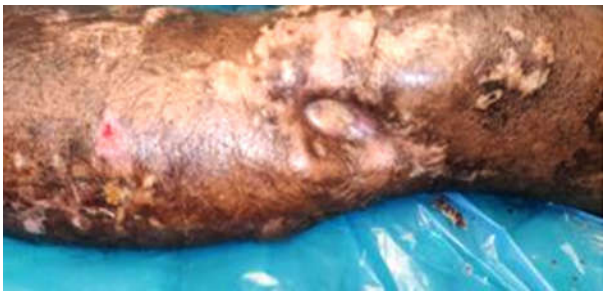

Fig. 1: Exposed bone and non healing ulcer at left proximal leg.

In our study, to attain a healthy granulation tissue over the defect with exposed bone, we used PRFM. Ten millilitres of venous blood were taken under rigorous aseptic conditions and placed in a sterile centrifugation tube devoid of anticoagulant. For 10 minutes, centrifugation was performed at 3000 rpm (about 400 g). Upper straw colored platelet deficient plasma (PPP), lower red colored fraction containing red blood cells (RBCs), and intermediate fraction containing PRFM were obtained. The upper layer of straw colour (PPP) was discarded. Using sterile forceps and scissors, PRFM was removed from red corpuscles at the base, leaving a thin RBC layer measuring roughly one millimetre in length that was deposited onto sterile gauze (Fig. 2).

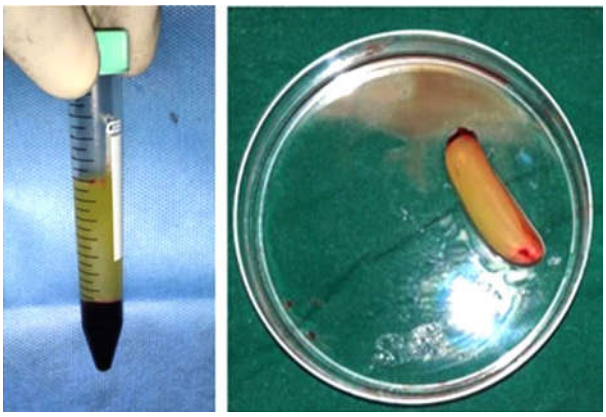

Fig. 2: Platelet rich fibrin matrix (PRFM)

The PRFM was applied to the raw region and sterile dressing was applied. Two sittings were performed one week apart, with the wound re-evaluated after two weeks. Healthy granulation tissue indicated that the wound was healing.

When the dressing was changed every 3-5 days, same procedure was repeated. (Fig. 3) After two weeks, the wound was examined again for signs of healing. Healthy granulation tissue indicated that the wound was healing.

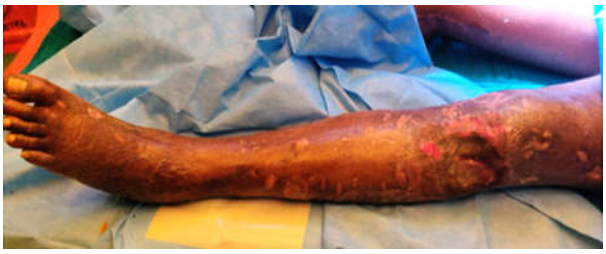

Fig. 3: Healthy granulation over exposed bone after the application of Platelet Rich Fibrin Matrix.

RESULTS

In our study, after two session of Platelet Rich Fibrin Matrix (PRFM) application thetwo third of the defect was cover with granulation tissues. (Fig. 4)

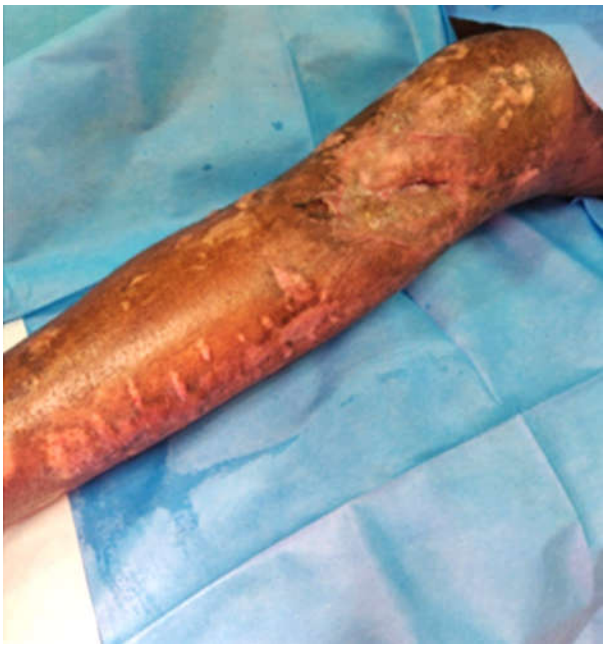

Fig. 4: Leg defect decreased significantly after two sesson of Platelet Rich Fibrin Matrix application

DISCUSSION

Platelets have a vital part in wound healing as well as haemostasis. Platelets emit cytokines and growth factors, which help keratinocytes, fibroblasts, and endothelial cells migrate, proliferate, and function better.[4] Fibrin is a type of fibrinogen that is active. Thrombin converts fibrinogen to insoluble fibrin, which aids platelet aggregation. Platelet concentrates are frequently devoid of coagulation components, hence platelet-rich fibrin matrix (PRFM) was created to address the expected features in tissue regeneration and wound healing.

Fibrinogen is concentrated in the upper section of the tube during centrifugation and combines with thrombin to create a fibrin clot. The release of these factors begins 5-10 minutes after clotting and lasts at least 60-300 minutes, resulting in a slow and steady release.[5]

PRFM is a fibrin matrix gel comprising platelets, leucocytes, cytokines, and circulating stem cells polymerized in a tetra molecular structure. PRFM preparation is simpler, requires lesshandling, and does not require the use of an anticoagulant or thrombin activator.[6] In a hospital; all of the necessary items are readily available. When opposed to the liquid formulation of APRP, the gel form of PRFM is easier to apply to the raw region. After fibrin formation, the action of autologous growth factors and the biomechanical rigidity of plasmatic proteins provide a unique architecture that aids in the healing process. Growth factors from activated platelet alpha granules, as well as others like fibrin, fibronectin, and vitronectin, play a crucial part in this process.Vessel endothelial growth factor (VEGF), fibroblast growth factor-b (FGFb), Platelet Derived Growth Factor (PDGF), hepatocyte growth factor (HGF), Epidermal Growth Factor (EGF), and angiopoietin-I are examples of these growth factors.[7]

CONCLUSION

This is a preliminary study to evaluate the use of platelet rich fibrin matrix(PRFM) in wound treatment where it has been demonstrated to be helpful in the management of chronic wound. To confirm the findings, a large multicentric, double-blinded control research with statistical analysis is needed.

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Conflict of Interest: None.

Disclosures: None.

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