

Role of Platelet Rich Fibrin Matrix (PRFM) in Pressure Injury Management

Abhishek Mallappa Jakanur ¹, Ravi Kumar Chittoria ^{2*}, Padmalakshmi Bharati Mohan ³, Jacob Antony Chakiath ⁴, Kanav Gupta ⁵

¹MBBS Junior Resident Department of General Surgery JIPMER Puducherry India – 605006

²MCh, DNB, MNAMS, FRCS (Edin), FRCS(Glasgow), FAMS, FTSI, FRSM, FACS, DSc, PhD, MBA Senior Professor and Associate Dean (Academic), Head of IT Wing and Telemedicine Department of Plastic Surgery and Telemedicine JIPMER Puducherry India – 605006

³MBBS, MS DNB General surgery, Mch Plastic surgery Assistant professor Department of plastic surgery JIPMER Puducherry India – 605006

⁴MBBS MS General Surgery Senior Resident Department of Plastic Surgery, JIPMER Puducherry India – 605006

⁵MBBS MS DNB General Surgery Senior Resident Department of Plastic Surgery, JIPMER Puducherry India – 605006

***Corresponding Author:** Ravi Kumar Chittoria, Senior Professor and Associate Dean (Academic), Head of IT Wing and Telemedicine Department of Plastic Surgery and Telemedicine JIPMER Puducherry India – 605006.

Received date: April 11, 2024; **Accepted date:** April 19, 2024; **Published date:** May 17, 2024

Citation: Abhishek M. Jakanur, Ravi K. Chittoria, Padmalakshmi B. Mohan, Jacob A. Chakiath, Kanav Gupta, (2024), Role of Platelet Rich Fibrin Matrix (PRFM) in Pressure Injury Management, *J Clinical Research and Reports*, 15(5); DOI:10.31579/2690-1919/363

Copyright: © 2024, Abhishek Mallappa Jakanur. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

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 pressure injury management. In our study, after two session of Platelet Rich Fibrin Matrix (PRFM) application, the pressure sore was cover with granulation tissues.

Keywords: platelet rich fibrin matrix (prfm); wound, pressure injury; management

Introduction

The pressure injuries 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.

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. 66-year-old male with post spinal cord injury pressure ulcers on the right trochanteric

region for 3 months. The patient was thoroughly investigated. Wound tissue culture was sent and appropriate antibiotic therapy was given. Regular cleaning and dressing was done, but the wound was not showing any good sign of healing.

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 (**figure 2**). 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.



Figure 1: Exposed bone and non healing pressure ulcer at right trochanter

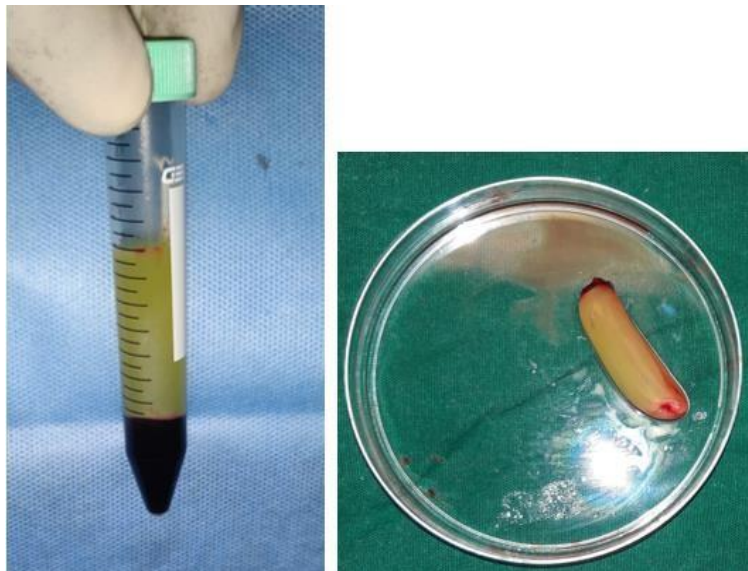


Figure 2: Platelet rich fibrin matrix (PRFM)

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



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

Results

In our study, after two sessions of Platelet Rich Fibrin Matrix (PRFM) application, the pressure sore was covered with granulation tissues. (figure 3)

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 less handling, 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 pressure injury treatment where it has been demonstrated to

be helpful in the management of Pressure injuries. To confirm the findings, a large multicentric, double-blinded control research with statistical analysis is needed.

Source of Funding: None.

Conflict of Interest: None.

Disclosures: None

References:

1. Choukroun J, Diss A, Simonpieri A, Girard M-O, Schoeffler C, Dohan SL, et al. (2006). Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part IV: clinical effects on tissue healing. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.*;101(3):e56-60.
2. Zhao L, Lian L, Suzuki A, Stalker TJ, Min SH, Krishnaswamy S, et al. (2015). Platelet Pitp-Alpha Promotes Thrombin Generation and the Dissemination of Tumor Metastasis but Has Minimal Effect on Vascular Plug Formation. *Blood.*;126(23):418.
3. Mosesson MW. (2005). Fibrinogen and fibrin structure and functions. *J Thromb Haemost JTH.*;3(8):1894-904.
4. Dhurat R, Sukesh M. (2014). Principles and Methods of Preparation of Platelet-Rich Plasma: A Review and Author's Perspective. *J Cutan Aesthetic Surg.*;7(4):189-97.
5. Choukroun J, Diss A, Simonpieri A. (2006). Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part IV: Clinical effects on tissue healing. *Oral Surgery, Oral Med Oral Pathol Oral Radiol Endodontol.*;101:e56-e60.
6. Nishimoto S, Fujita K, Sotsuka Y et al. (2015). Growth Factor Measurement and Histological Analysis in Platelet Rich Fibrin: A Pilot Study. *J Maxillofac Oral Surg.*;14:907-13.
7. Anitua E, Pino A, Orive G. (2017). Opening new horizons in regenerative dermatology using platelet-based autologous therapies. *Int J Dermatol.*;56:247-251.



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: **Submit Manuscript**

DOI:10.31579/2690-1919/363

Ready to submit your research? Choose Auctores and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

At Auctores, research is always in progress.

Learn more <https://www.auctoresonline.org/journals/journal-of-clinical-research-and-reports>