



Case Report

Volume 11 Issue 3 - June 2020
DOI: 10.19080/JOJCS.2020.11.555811

JOJ Case Stud

Copyright © All rights are reserved by Madhav Rayate

Case Study of Traumatic Chronic Wound Healing by using Autologous Bone Marrow Mononuclear Cells (BM-MNC) & Platelet Rich Plasma (PRP)



Madhav Rayate*

Stem Medica India, India

Submission: May 25, 2020; **Published:** June 02, 2020

***Corresponding author:** Madhav Rayate, Stem Medica India, 8, 9, Chandresh classic, lodha heaven, Dombivali east, Thane, Maharashtra, 421204, India

Abstract

Chronic Wound is the type of Wound which couldn't heal in 3 months duration & not following wound healing steps as per timely manners [1]. Chronic Wound seems stay in inflammatory stage for long time [2,3]. In Acute Wound the stages of healing are in stepwise & timely manner, the production & degradation of Collagen molecules are balanced, in Chronic Wound degradation of Collagen is more [4,5].

Aim: evaluation of safety and efficacy of BM-MNC & PRP in chronic Wound Healing.

Method: A 60 years old male Patient was consulted at Outpatient department on February 2018 in our center, Patient was underprivileged and poor, Wage worker. The chief complaint was pain & Wound over Right leg above ankle joint on anterior part. He had traumatic history of fall down 6 months back, at that time it was abrasion which later on infected and not heal. He was consulted to other Doctors tried everything, but nothing help him. He wasn't having Diabetes, Hypertension or any other major illness. Before wasting time by doing conventional treatment intervention which he was tried, we explain him about stem cell therapy, He agreed for same, after getting institutional ethical committee permission & written consent we injected BM-MNC & PRP intradermally & below wound bed.

Results: We monitor patient for next 6 months, we done local Wound assessment by measuring size of wound. The Wound was completely heal in 3 months, we injected Autologous BM-MNC & PRP single time then we injected PRP two times in next month in every 15 days.

Keywords: Chronic wound; Non healing wound; Mononuclear cells; Platelet rich plasma; Stem cells, Regenerative medicine

Introduction

Wound healing is replacement of damaged tissue by living tissue; skin contains epidermis which is superficial layer of skin, Dermis & subcutaneous tissue. In undamaged Skin Epidermis & Dermis forms barrier to external environment, when the barrier broken then biochemical process set into motion to repair that [6,7].

There are four stages of Wound Healing accordingly

- a) Hemostasis (blood clotting).
- b) Inflammation.

- c) Proliferation (growth of new tissue).
- d) Maturation (Remodeling).

Stem cell is undifferentiated cells which is capable to develop into any type of cells exist in human body & having property of self-renewal, proliferation for long time [8]. Bone marrow is the rich source of various stem cells including Hematopoietic stem cells, Mesenchymal stem cells, Progenitor stem cells, very small embryonic stem cells [9]. Stem cells do regeneration by trans-differentiation into skin cells as well as by paracrine effect.

Platelet rich plasma (PRP) contain various growth factors like Platelet derived growth factor (PDGF), epidermal growth factor (EGF), fibroblast growth factor (FGF), vascular endothelial growth factor (VEGF), insulin like growth factor (IGF1,IGF2).

Case Report

A 60 Years old male was come in Outpatient department for consultation in year 2018; he had chief complaint of Wound over Right leg above ankle joint on anterior site. He was alcoholic, nonsmoker. He doesn't had Diabetes, hypertension or any major illness. He had history of traumatic injury & was consulted & got treated but nothing help out. The present wound was almost 6 months old. On examination the wound was exudating, unhealthy & measuring 4x4cm. vital parameters were Blood pressure 130/80, Pulse rate 90/min, SpO2 99% at room temperature, Respiratory rate 22/min, CVSS1S2 normal, CNS Normal, Air entry normal.

Local wound examination

exudate ++, edema ++, tenderness +, foul smell +, chest X Ray was Normal, no deformity or fracture found in leg X - Ray, infrapopliteal arterial & venous color Doppler study was Normal.

Bone marrow aspiration

Colony stimulating factor injection was given subcutaneously for 3 days (5ug/kg/day), then by following all aseptic technique. We collected 110ml of bone marrow from Anterior iliac crest & put that in Acid citrate dextrose centrifuge tubes to prevent

coagulation. Bone marrow aspiration was done under local anesthesia; we collected venous blood 40ml in ACD tubes.

Bone marrow was poured over ficoll Paque density gradient slowly in separate centrifuge tubes. Then spin for 20 minutes at 2000rpm in centrifuge, finally collected buffy coat & mononuclear cell counted by cell counter same way Platelet Rich Plasma (PRP) processed.

We prepared 120 millions of mononuclear cells & mixed with 5ml PRP.

- a) Procedure: Clean part with betadine. We done surgical debridement to remove dead, unhealthy tissue.
- b) Stem cell injection: then we injected stem cell and PRP subcutaneously surrounding wound edges, below wound bed & inside wound.
- c) Wrap wound with sterile cotton & bandages.
- d) Kept patient in outpatient ward for observation.
- e) We follow patient every week, done dressing with antiseptic ointment.
- f) We injected PRP on day 15 & day 30.

Result

We noticed in subsequent follow up, Wound margin start inward movement, wound shrink, exudate stopped, wound bed was pink & healthy Figure 1.



Figure 1: Wound over right leg above ankle joint on anterior site A. before stem cell injection B. 15 days after treatment C. 1 month After Treatment D. 2 months after treatment.

In 2 month post therapy wound was completely healed.

Discussion

In present case study we noticed that Bone marrow stem cells are powerful factory of cytokines & growth factors. Stem cells could do job of wound repair by trans-differentiation into epithelial cells, self-renewal & proliferation. Mononuclear cells & Platelet Rich Plasma secret PDGF, FGF, VEGF, EGF & other cytokines which initiate repair and proliferation of existing epithelial & other stem cells.

Randomized, double blind, multicentric clinical trials should be carried out. Preclinical studies shows safety and efficacy of bone marrow stem cells. Bone marrow is cocktail of various cell types, bone marrow Hematopoietic stem cell transplantation for blood cancer & inherited blood disorders is regularize procedure. Autologous bone marrow mononuclear cell therapy doesn't have Graft versus host disease (GVHD), No rejection issue & No risk of infection transmission. Using of Platelet Rich Plasma along with mononuclear cells give additional benefits, Platelets after degradation release various growth factors. Wound healing is cascade of multiple steps, Mesenchymal stem cells trans-differentiate into keratinocytes, epithelial cells which proved by *in vitro* study.

Figure 1:



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/JOJCS.2020.11.555811](https://doi.org/10.19080/JOJCS.2020.11.555811)

References

1. Mustoe T (2005) Dermal ulcer healing: Advances in understanding (PDF). Tissue repair and ulcer/wound healing: molecular mechanisms, therapeutic targets and future directions. Paris, France: Euroconferences.
2. Snyder RJ (2005) Treatment of nonhealing ulcers with allograft. *Clinics in Dermatology* 23(4): 388-395.
3. Jennifer ET, Laity PR, Hicks J, Wong SS, Norris K, et al. (2005) Extent of iron pick-up in deferoxamine-coupled polyurethane materials for therapy of chronic wounds. *Biomaterials* 26(30): 6024-6033.
4. Edwards JV, Howley P, Cohen IK (2004) *In vitro* inhibition of human neutrophil elastase by oleic acid albumin formulations from derivatized cotton wound dressings. *International Journal of Pharmaceutics* 284(1-2): 1-12.
5. Ute S, Abel M, Wiegand C, Klemm D, Elsner P, et al. (2005) Influence of selected wound dressings on PMN elastase in chronic wound fluid and their antioxidative potential *in vitro*. *Biomaterials* 26(33): 6664-6673.
6. Nguyen DT, Orgill DP, Murphy GT (2009) The Pathophysiologic Basis for Wound Healing and Cutaneous Regeneration. In: Orgill DP, Blanco C (Eds.), *Biomaterials for Treating Skin Loss*. Elsevier, pp. 25-57.
7. Rieger S, Zhao H, Martin P, Abe K, Lisse TS (2015) The role of nuclear hormone receptors in cutaneous wound repair. *Cell Biochemistry and Function* 33(1): 1-13.
8. Atala A, Lanza R (2012) *Handbook of Stem Cells*. Academic Press, USA, p. 452.
9. American Society of Clinical Oncology (ASCO) (2018) What is a stem cell transplant (bone marrow transplant)?

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
 - Swift Peer Review
 - Reprints availability
 - E-prints Service
 - Manuscript Podcast for convenient understanding
 - Global attainment for your research
 - Manuscript accessibility in different formats
- (Pdf, E-pub, Full Text, Audio)**
- Unceasing customer service

Track the below URL for one-step submission
<https://juniperpublishers.com/online-submission.php>