

# Platelet - Rich Plasma (PRP) and Platelet - Rich Fibrin (PRF) Clot Dressing in Chronic Wound Management: Two Case Reports

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**Abstract:** Platelet - rich plasma (PRP) and platelet - rich fibrin (PRF) are natural blood components used for cosmetic and medical purposes, including treating conditions such as hair loss, skin wrinkles, tendonitis, and joint injuries. Chronic wounds, such as bed ulcers and diabetic ulcers, present challenging medical issues to treat, significantly impacting patients' quality of life and those responsible for their care. While there have been numerous attempts to utilize PRP and PRF dressings in the management of chronic wounds to enhance the healing process, there remains a scarcity of comprehensive studies on this subject. In this article, we present two cases: Case No.1 involves a post - chemical burn chronic ulcer treated by injecting PRP and applying PRF dressing weekly, resulting in complete healing after three weeks. Case No.2 involves a post - pilonidal sinus abscess incision with a drained cavity, which was treated with PRP injection and PRF clot dressing, achieving complete healing after eight weeks. We prepared PRP and PRF clots in our laboratory by collecting blood samples from our patients and processing them as described above. Based on our study, we recommend that our colleagues consider adopting this technique for managing chronic wounds such as diabetic and bed ulcers.

**Keywords:** platelet - rich plasma (PRP) and platelet - rich fibrin (PRF) chronic wound management, PRF, PRP, diabetic foot management, bed ulcer management

## 1. Introduction

Chronic wounds present a challenging issue for medical teams, significantly impacting patients' lifestyles and causing substantial health and financial problems [1]. Blood is composed of several components, including red cells, white cells, platelets, and plasma rich in proteins and other nutrients. Platelet - rich plasma (PRP) was initially utilized in maxillofacial surgery in France at the beginning of this century by Choukroun [2]. Subsequently, it found applications in the cosmetic field for managing hair loss and skin wrinkles, as well as in medical treatments for conditions like tendonitis and intra - articular injuries, aiding in the regeneration of joints and cartilage due to its high concentration of growth factors, cytokines, and inflammatory mediators. It is well - established that platelets, white blood cells (WBCs), and fibrin in plasma play a crucial role in the wound healing process and tissue reconstruction, owing to growth factors such as Transforming growth factor beta 1 (TGF -  $\beta$ 1), platelet - derived growth factor - AB (PDGF - AB), platelet - derived growth factor - BB (PDGF - BB), bone morphogenetic protein 2 (BMP - 2), fibroblast growth factor 2 (FGF - 2), and vascular endothelial growth factor (VEGF) [3], as well as other inflammatory mediators that initiate and enhance wound healing and remodeling. Platelet - rich plasma (PRP) and platelet - rich fibrin (PRF) are categorized into four types (PRP without WBC, PRP with WBC, PRF without WBC, and PRF with WBC); however, all share the same medical applications [4, 5]. The mechanism of action involves the injection of PRP or the application of PRF clot dressing, which releases a high amount of activated growth factors and cytokines from platelets. This promotes and enhances tissue repair, treats infections through the activation of leukocytes, and aids in healing [6]. PRP and

PRF are characterized by their cost - effectiveness compared to other treatment modalities, especially growth factor injections. They also have a high safety rate since they are derived from the patient's blood, eliminating the risk of allergies, transmission of infections, or drug interactions. Furthermore, they are quick and easy to prepare in the laboratory using a centrifugation device.

## 2. Method

The process of preparing nearly 4 ml of platelet - rich plasma (PRP) involves drawing a 20 ml blood sample from the patient into tubes containing an anticoagulant. The tubes are then placed in a centrifuge to separate red blood cells from plasma. The centrifugation is performed twice: first to separate red blood cells, and then to further isolate any remaining red blood cell remnants. At this point, the plasma is divided into platelet - poor plasma (PPP) (located at the top) and platelet - rich plasma PRP (located at the bottom), both of which are ready for injection. On the other hand, platelet - rich fibrin (PRF) is prepared by drawing a 30 ml blood sample from the patient into a tube that lacks an anticoagulant. This tube is then placed in a centrifuge, separating platelet - poor plasma (PPP) at the top and a yellow fibrin clot with a high platelet concentration (PRF) in the middle, connected to a layer of red blood cells. This fibrin clot is subsequently separated from the blood and utilized as a dressing for wounds. In our cases, we provide evidence that PRP local injection and PRF dressing effectively initiate new healing processes in chronic wounds and have an antimicrobial effect.

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### 3. Case Presentation

#### Case No.1:

A 23 - year - old patient complained of a left forearm unhealed ulcer after applying acid to remove a tattoo two months before our visit. No other complaints. He gives no past medical, surgical, or allergic history.

A physical exam revealed a left forearm mild infected chronic ulcer Figure No.1 about (4\*2 cm) in diameter Figure No.2 with red granule tissue and fibrotic wound edges preventing the wound from recovering. After debridement and irrigating the wound with H<sub>2</sub>O<sub>2</sub> to achieve hemostasis and as an antimicrobial agent, we inject PRP under the ulcer bed and wound edges. Then we apply the PRF clot as a dressing on the ulcer surface.

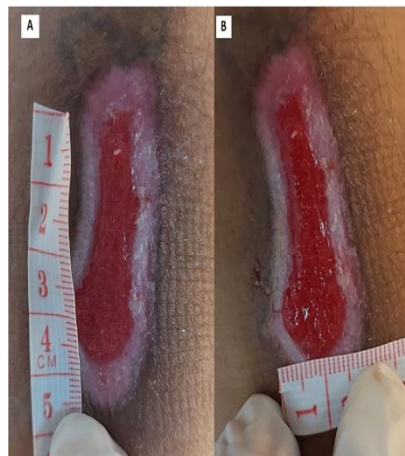


**Figure 1:** Chronic ulcer due to chemical burn two months before his visiting us



**Figure 2:** A.4cm in longitudinal Lt forearm mild infected chronic ulcer, B.2cm in transvers dimension

After a week, his wound looked reddish with healthy granule tissue and started to shrink (3.5\*1.5cm) Figure No.3. Again repeat PRP intra - ulcer injection and PRF dressing without any other local or systemic medication.



**Figure 3:** Healthy granule tissue after one week. A.3.5 cm in longitudinal dimension. B.1.5 cm in transvers dimension.

A week later, the patient's wound looked healthy without infection signs and had shrunk completely. Figure No.4.



**Figure 4:** Full recovery after three weeks

#### Case No.2:

A 16 - year - old female complained of a natal cleft painful lump with intermittent stinking smell discharge two days before her visiting us, she gave a history of pilonidal sinus excision in another hospital one year before and was afraid of pilonidal sinus recurrent, also she has chronic iron deficiency anemia on treatment by iron supplement, no history of any medical allergy, on the exam, she found a febrile, in mild pain and scare from repeating surgery, natal cleft examination revealed a mild tender, soft, irregular, swelling on the upper part of the previous surgical scar, minimal bloody purulent oozing from a small opening on the lower part of the scar, under local anesthesia and antiseptic condition we expand the open and curate the abscess cavity then irrigate it by H<sub>2</sub>O<sub>2</sub> and packing the cavity by antibiotic dressing, discharge the patient on oral antibiotic and advice about daily dressing, and give second appoint after week, a week later patient report very good improvement and no more pus coming out, ultra - sonographic study revealed a cavity which approximately measures (39\*20\*15 mm) in diameters Figure No.5.



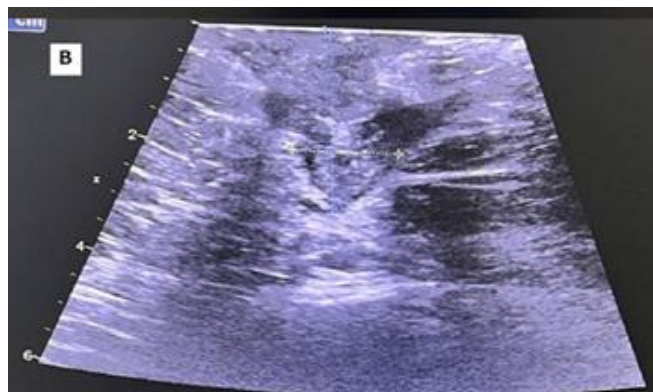
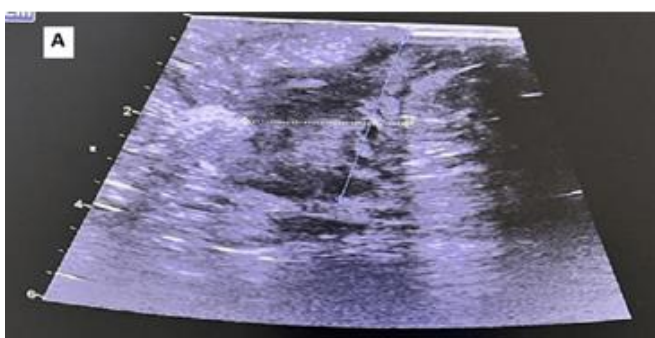
**Figure 5:** Post - pilonidal recurrent abscess incision and drain cavity which approximately measures (39\*20\*15 mm). A.39\*15 mm in longitudinal and depth dimensions. B.20 mm in transvers dimension.

We discussed with the patient's father about surgical treatment choice or new PRP and PRF alternative treatment which he prefers to proceed with. During the same visit, we prepared PRP and PRF clot, Figure No.6, as described above injected PRP around the cavity, and packed the cavity by PRF clot.



**Figure 6:** Platelet - rich fibrin (PRF) clot.

A week later, the patient came back with minimal serum discharge with no signs of infection, the PRP and PRF clot were applied again like before. After three repeated procedures once weekly, her cavity started to shrink in size and the ultrasonography study showed 30\*18\*15 mm. Figure No.7.



**Figure 7:** After three weeks, ultrasonography showed the cavity started to shrink. A.30 \*15 mm in longitudinal and depth dimensions. B.18 mm in transvers dimension

One month later, the patient came back with a completely closed cavity without any other complaints.

#### 4. Discussion

Regenerative medicine has gained popularity over the past decade. However, it continues to face numerous challenges and remains not fully understood or extensively studied. Platelet - rich plasma (PRP) and platelet - rich fibrin (PRF) have been harnessed to promote healing due to their high concentrations of growth factors and cytokines, which target specific cell lineages to repair injured tissue. They have found applications in various medical fields, including maxillofacial surgery (such as sinus floor elevation, regeneration following cyst ablation, maxillary regeneration, and other dental treatments) [2], cosmetic surgery (e. g., nose and ear), and bone grafting. In orthopedic surgery, PRP has been employed in procedures like anterior cruciate ligament (ACL) repair and patellar tendonitis treatment, although some studies have shown a suppressive effect on chondrogenesis with leukocyte - rich PRP [7]. PRP and PRF are prepared by withdrawing blood from the patient and processing it using a centrifuge device. Tubes containing an anticoagulant agent are used for PRP preparation, while PRF clot preparation is done without an anticoagulant agent. PRP and PRF can be classified into two categories: with or without leukocytes, and with activated or inactivated growth factors, although the latter is rare since growth factors and cytokines are typically activated upon collection or application to tissue. Regardless of the classification, PRP and PRF are employed using the same technique and produce similar effects on tissue and cells. The high concentrations of growth factors and cytokines found in platelets, which are released when applied to damaged tissue surfaces, have been exploited to stimulate cell regeneration and initiate the healing process, as mentioned previously [6]. Additionally, because PRP and PRF contain leukocytes and substantial concentrations of inflammatory mediators, they function as local antimicrobial agents and aid in resolving infections [3, 4, 5]. The utilization of PRP and PRF is still not fully comprehended and warrants further study in the future.

## 5. Conclusions

PRP and PRF are relatively new cosmetic and medical treatment modalities that are not yet fully understood. They rely on high concentrations of growth factors and cytokines to stimulate the healing process. In this study, we provide evidence suggesting that PRP injections into chronic wounds and the use of PRF dressings are highly beneficial for initiating a new healing process. Additionally, they demonstrate an antimicrobial effect, primarily due to the presence of leukocytes and inflammatory mediators. Based on our study findings, we recommend considering this technique for the management of patients who suffer from chronic wounds, such as bed ulcers or non-healing diabetic ulcers.

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