

Pictorial CME

Role of Platelet Rich Fibrin Non-healing Ulcers

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Blood is composed of both solid and liquid components. Liquid content is known as plasma and small solid components are red cells, white cells and platelets etc. Among all these solid components, platelets are very much important for clotting the blood. It contains hundreds of protein called as growth factors.

Platelet rich plasma contains concentric protein, which is also known as autologous conditioned plasma. It is derived from whole blood and red blood cells should be removed by centrifugation. Platelet rich plasma are very much important to heal the injuries like musculoskeletal problems. It releases growth factors which is 5-10 times more than human blood.

Platelet rich fibrin is another type of PRP which is also called as second generation PRP. It is the blood product which is produced by centrifugation at a comparatively lower speed than in PRF with distinct layers.

Difference between PRP and PRF :

- PRP is produced by centrifuging the blood at 2400 rpm for 10 minutes then second spin 3600 rpm for 15 minutes, but in the case of PRF centrifuge the blood at 2700 rpm for 15 minutes.
- PRP is collected in a tube containing anticoagulant but in PRF, no anticoagulant is used.

Platelet Rich Fibrin (PRF) :

Platelet rich Fibrin contains concentric protein, platelets and leucocytes. It is derived from whole blood and present in a complex fibrin matrix which helps to accelerate wound healing, tissue regeneration, increases stimulation of growth factors which is 5-10 times more than human blood. It also helps to form new blood vessels.

Non healing ulcers :

Non healing wounds are developed by the failed progression of repair and regeneration process through time with zero anatomical and functional improvement which called as ulcers as well.

Causes of non-healing ulcer :

There are many causes of non-healing (chronic) ulcers and they include :

- Problems with blood supply or drainage
- Nerve damage
- Excess pressure

- Cancer
- Infection.
- Diabetes
- Leprosy etc.

When determining the cause of a non-healing ulcer, it is always important to assess the blood supply and nerve function to the area. If cancer or unusual infection is suspected, as skin biopsy may be required. It is important to seek medical attention early for non-healing ulcers, so that appropriate diagnostic testing can be done and treatment commenced at an early stage.

Autologous versus Allogenic:

Autologous — The patient's own stem cells are used.
Allogenic — The stem cells come from a donor.

Syngeneic — The stem cells come from all identical twin.

Role of PRF in Non-healing Ulcer :

Platelet-rich-fibrin enhances wound healing by promoting the healing process secondary to its Growth factors. These include platelet-derived Growth factors ($\alpha\alpha$, $\beta\beta$, and $\alpha\beta$), fibroblast Growth factor, vascular endothelial Growth factor, epidermal Growth factor, insulin-like Growth factor, and transforming Growth factor. These Growth factors stimulate mesenchymal cell recruitment, proliferation, extracellular matrix degeneration, and cell differentiation for tissue regeneration. These factors are released from α granules in response to platelet activation by inducers of platelet aggregation.

Stages of healing :

- Haemostasis (Blood clotting)
- Inflammation
- Proliferation (Growth of new tissue)
- Maturation (Remodeling)

Stages of Healing and Few Examples :

Case 1 :



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(A) After applying the 1st PRF in the ulcer region of the left hand



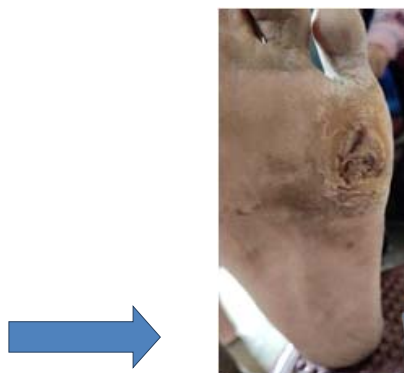
Fig 1 — Freshly prepared Autologous PRF



(B) After applying the 2nd PRF in the same region of the left hand (Between 1-2 weeks)



(C) Formation of granulation tissue
Fig 1 — Shows the stages of healing (PRF)



(I) Diabetic foot, (II) After one week of 1st PRF, (III) After the 2nd PRF, formation of granulation tissue

Fig 2b — Stages of healing (PRF)

Case 2 :



Fig 2a — Freshly prepared Autologous PRF

CONCLUSION

Platelet rich fibrin is the new and very much promising technique in the field of Regenerative medicine to regrowth and helps to heal the damaged tissues of the body through activating body's own mechanism of healing via haemostasis, inflammation, proliferation and maturation. In current scenario non healing ulcers are very common in diabetic patient. Controlling diabetes through other methods are also effective but in modern medicine application of PRF improves the granulation tissue formation that's why cell therapy is very much active method to get rid of these non-healing ulcers.