

## Platelet Rich Fibrin (PRF) – A Novel Healing Aid For Extraction Socket In Diabetic Patients

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**Abstract:** PRF – Platelet Rich Fibrin is an autologous gel like material derived from blood by centrifuging it. In diabetic patients major challenges after extraction are high infection rates and delayed healing. Putting PRF in extraction socket in diabetic patient leads to faster healing and there is no need of antibiotic either preop or postop for infection prevention. As PRF itself has inert growth factors and immune factors, biologically it acts as a healing aid. This method also reduces multiple visits of patients in hospital set-ups.

**Keywords:** Centrifuge, Diabetes, Healing, Platelet rich fibrin (PRF).

### I. Introduction

Diabetic patients have poor healing qualities because of systemic effects of the disease. In such cases for the healing of the extraction socket; PRF can be the 'holy grail'. The classical technique for PRF preparation was invented by Dr. Joseph Choukroun in 2000 [1]. Platelet-rich fibrin (PRF) described by Choukroun et al. is a second-generation platelet concentrate which contains platelets and growth factors in the form of fibrin membranes prepared from the patient's own blood free of any anticoagulant or other artificial biochemical modifications. The PRF clot forms a strong natural fibrin matrix, which concentrates almost all the platelets and growth factors of the blood harvest and shows a complex architecture as a healing matrix with unique mechanical properties which makes it distinct from other platelet concentrates [2].

### II. Materials and Method

Fifteen known cases of diabetes were selected irrespective of age and gender. All patients were on oral anti diabetic drugs. All cases had random blood sugar > 200 mg%. All cases were of Mandibular teeth extraction. Written informed consent was obtained from all individual participants included in the study. Extraction was done under local anaesthesia with adrenaline 1:1, 00,000. Neither preop nor postop antibiotics given to any diabetic patient. Analgesic given only if required.

#### PRF preparation and its use:

10 ml venous blood was taken and transferred into the test tube. Then as per Choukroun's criteria centrifugation of blood was done at 3000 rpm for 15 minutes. [2] (Fig 1). During the centrifugation process, when the blood gets in contact with the test tube wall, the platelet gets activated leading to the initiation of coagulation cascade. After centrifugation, on the basis of sedimentation principle, the resultant product consists of three layers. The most inferior layer contains the red cell corpuscular base and the most superior layer contains the acellular platelet poor plasma. In between these two layers, platelet rich fibrin clot is found (Fig 2, 3). It is derived with tissue holding forcep from test tube and put on sterile gauze wetted with normal saline. It is squeezed between two gauze pieces to remove any red corpuscular base attached with it. Gel like PRF clot is thus obtained for use (Fig 4).



Fig. 1 Centrifuge machine

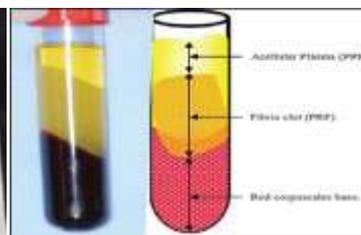


Fig. 2 Three layers



Fig. 3 PRF in test tube

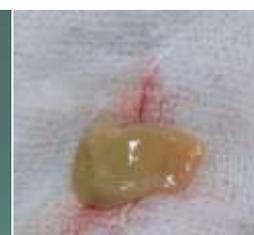


Fig. 4 PRF gel

This gel like material was put inside the extraction sockets of diabetic patients (Fig 5,6 & 7). Simple interrupted sutures given. Patients were recalled after 7 days to observe the healing, infection and pain.



**Fig. 5** Mandibular first molar to be extracted



**Fig. 6** Extraction socket



**Fig. 7** Socket filled with PRF gel

### III. Results

All patients were recalled after 7 days. No signs of infection or redness or swelling found in any of the patients. Healing was measured on the basis of Healing index by Landry [7].

Healing index by Landry

- |              |  |
|--------------|--|
| 1. Very poor | Tissue colour $\geq$ 50 % of gingiva red<br>Response to palpation: bleeding<br>Granulation tissue: present<br>Incision margin: not epithelialized, with loss of epithelium beyond incision margin<br>Suppuration present |
| 2. Poor      | Tissue colour $\geq$ 50 % of gingiva red<br>Response to palpation: bleeding<br>Granulation tissue: present<br>Incision margin: not epithelialized, with connective tissue exposed  |
| 3. Good      | Tissue colour $\geq$ 25 and $<$ 50 % of gingiva red<br>Response to palpation: no bleeding<br>Granulation tissue: none<br>Incision margin: no connective tissue exposed   |
| 4. Very good | Tissue colour $<$ 25 % of gingiva red<br>Response to palpation: no bleeding<br>Granulation tissue: none<br>Incision margin: no connective tissue exposed   |
| 5. Excellent | Tissue colour: all tissues pink<br>Response to palpation: no bleeding<br>Granulation tissue: none<br>Incision margin: no connective tissue exposed   |

Resultant healing was very good to excellent in each patient(Fig 8); on the basis of mean value of index score, that is 4.13 (Table 1) . Pain was measured on the basis of VAS – Visual Analogue Scale.

**Table – 1 Healing Index And VAS Of Each Patient**

Sr. No. (Patients)	RBS (mgm%)	HEALING INDEX		VAS		SIGNS OF INFECTION
		Score	Inference	Score	Inference	
1	283	4	Very good	1	No pain to mild pain	Absent
2	317	4	Very good	2	Mild pain	Absent
3	296	5	Excellent	0	No pain	Absent
4	352	4	Very good	1	No pain to mild pain	Absent
5	278	5	Excellent	1	No pain to mild pain	Absent
6	312	3	Good	3	Mild to moderate pain	Absent
7	428	4	Very good	1	No pain to mild pain	Absent
8	334	5	Excellent	0	No pain	Absent
9	237	4	Very good	1	No pain to mild pain	Absent
10	419	4	Very good	2	Mild pain	Absent
11	367	4	Very good	1	No pain to mild pain	Absent
12	339	3	Good	3	Mild to moderate pain	Absent
13	441	4	Very good	1	No pain to mild pain	Absent
14	315	5	Excellent	0	No pain	Absent
15	391	4	Very good	1	No pain to mild pain	Absent

mean value of healing index : 4.13



**Fig. 8** Healing after 7 days

#### IV. Discussion

Extraction socket healing has always been issue in diabetic patients. Pathological factors to be considered mainly for healing in diabetes are AGE – Advanced Glycation End products, Thickening of capillary basement membrane and Persistent initial inflammatory reaction. AGEs affect the physiologic collagen turnover during late healing phase. Thickening of capillary basement membrane prevents migration of inflammatory cells from capillary to the healing tissue [5,6]. Persistent initial inflammatory reaction promotes continuous ingress of neutrophils and reactive oxygen species at healing tissue. Because of persistent ingress of neutrophils, there is continuous release of lysosomal enzymes from these neutrophils, which keeps on degrading the healing tissue [4].

There is also degranulation of growth factors occurs in diabetes and ultimately leads to poor wound healing. PRF itself has good amount of growth factors like epidermal, platelet derived, transforming growth factor beta, insulin like growth factors, vascular endothelial and basic fibroblast growth factors [3]. Thus it helps to switch the poor wound healing to the normal wound healing. That is comparable to the results we found in our study. (Fig 8, Table1).

PRF is also considered as L-PRF, The Leukocyte rich PRF, which enhances the immune properties and imparts its role in infection prevention. As we found in our result, there were no signs of infection in any of the cases. PRF also has glycoproteins like thrombin that helps in molecular adhesion [1].

Mechanical properties of PRF that helps in healing are 3D flexible fibrin structure which easily incorporates the circulatory cytokines, slow polymerization of fibrin leads to gradual release of growth factors which is ideal for healing and it also mechanically protects the extraction site [1].

The major advantage of using PRF in diabetic patient; we found in our study is neither preop nor postop antibiotics required. Thus it prevents antibiotic side effects especially in elder patients. And in long term regime it will prevent even developing antibiotic resistance. It is also cost effective for patients.

Other advantages of using PRF are it is autologous; derived from patient's own blood so no chances of immune rejection; less technique sensitive and less time consuming.

Drawbacks of PRF are it should be used as early as possible, once it is made, as delaying leads to shrinkage, dehydration and reduced growth factor concentration. It cannot be stored because of chances of bacterial contamination and quantity is less for big surgical defects [2].

## **V. Conclusion**

PRF is emerging as a promising healing aid in systemically compromised patients like Diabetics where healing process is compromised. Immune properties of PRF avoid infection and promote socket healing without using antibiotics. It can be the useful healing aid for developing countries because of its biological advantages, cost effectiveness and ease of use with few precautions.

PRF is not only Platelet Rich Fibrin but it is blood's own Purity which Raises Functionality!!

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