

TITANIUM ACTIVATED PRF (T-PRF) A NOVEL AVENUE FOR PERIODONTAL REGENERATION

Periodontology

Shiva Manjunath R.G	Professor and Head, Department of Periodontology and Implantology, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.
S. S Sai Karthikeyan*	Postgraduate, Department of Periodontology and Implantology, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India. *Corresponding Author
Priyansha Rathore	Postgraduate, Department of Periodontology and Implantology, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.
Shiva Shankar Gummaluri	Postgraduate, Department of Periodontology and Implantology, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.

ABSTRACT

Platelet rich Fibrin discovered by Choukran has been used for regenerative purpose since long. Due to its possible biohazards that could occur with silica activated test tubes, alternative for it was awaited. A newer platelet concentrates i.e. Titanium Activated PRF (T-PRF) is a 3rd generation platelet concentrate that was given by Tunali was considered to help in regeneration. The aim of the study is to evaluate the outcome of T-PRF, in the treatment of a periodontal intrabony defect clinically and radiographically. A female patient aged 26 was diagnosed with localised periodontitis irt 46 with probing depth of 8mm and radiographic bone loss. TPRF was prepared according to Tunali's protocol and was placed at defect site. At 6 months follow-up there was significant increase in bone level and improvement in probing depth. To standardize the measurements, all the clinical measurements were made with UNC-15 probe and radiographs were taken by using a X-ray film holder. According to the results obtained there was significant improvement in alveolar bone level and that TPRF can be used as an alternative to PRF for periodontal regeneration.

KEYWORDS

intra bony defect, T-Prf, periodontitis

BACKGROUND

In the past few years, there has been an increased interest in the use of platelet-rich products for the treatment of many clinical conditions in dentistry. Platelet-rich fibrin was first as an autologous leukocyte- and platelet-rich fibrin (L-PRF) biomaterial in France since 2001^[1]. Unlike the other platelet concentrates, L-PRF requires neither anticoagulant nor bovine thrombin (nor any other gelling agent). Hence, L-PRF is considered as a second-generation platelet concentrate^[2-7]. Without an anticoagulant, all most all platelets are activated within few minutes of centrifugation, which marks the coagulation cascade. Fibrinogen is initially present in the upper part of the tube, before thrombin converts it into fibrin. A fibrin clot is then formed in the middle of the tube between the red blood cells at the bottom and the plasma at the top^[4]. Successful results performed by Z. Mazor et.al., 2009, A. R. Pradeep et. al., 2011 and J. Choukroun et. al., 2011 have been reported with L-PRF^[9-12], but some studies indicate a possible health hazard with glass-evacuated blood collection tubes with silica activators (S. M. O'Connell et. al., 2007)^[12]. The silica particles in the tube, although dense enough to sediment with the red blood cells, are small enough for a fraction to remain colloidal suspended in the buffy coat, fibrin, and platelet plasma layers; therefore, these particles might reach the patient when the product is used for treatment. A newer platelet concentrate i.e. Titanium Activated PRF (T-PRF) is a 3rd generation platelet concentrate that helps in regeneration^[13]. This material is used to avoid any adverse effects in the short or long term, or both, of dry glass or glass-coated plastic tubes and to eliminate any speculations about silica. Activation of platelets with titanium compared with activation with silica particles provides the distinctive characteristics of T-PRF, including its increased biocompatibility

In this report, to evaluate the outcome of T-PRF, we present the clinical and radiographic changes of a patient using T-PRF material in the treatment of periodontal intrabony defect.

CASE DESCRIPTION

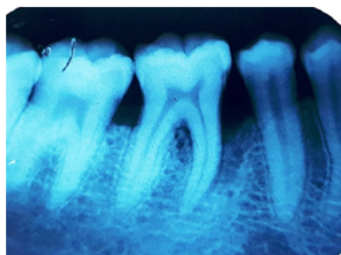
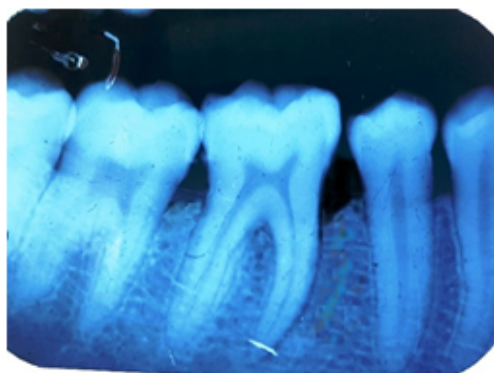
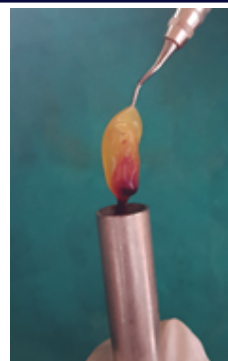
A female patient aged 26 years came to the department of Periodontics, Institute of Dental Sciences, Bareilly, U.P, India, with the chief complaint of food lodgement in right lower back teeth region. On examination, the patient was systemically healthy and was not taking any sort of medication. On periodontal and radiographic examination, it was found that there was a deep intrabony defect extending to the middle third of right lower mandibular 1st molar with a probing depth

of 8mm as measured with UNC -15 probe. The patient did not give symptoms of pain in relation to the same tooth and had no tenderness on percussion. There was positive electric pulp test response suggesting the concerned tooth was vital. The diagnosis was made to be localized chronic periodontitis irt 46.

Initial therapy consisted of supra gingival & sub gingival scaling and root planing. Patient was given oral hygiene instructions and was asked to visit back after 4 weeks. On the 2nd visit there was no bleeding on probing and no inflammation but presented with the same persistent 8mm periodontal pocket. The patient was then advised for periodontal flap surgery and explained regarding the same in patient's vernacular language.

On the day of surgery 10 ml blood was collected using venepuncture for the preparation of T-PRF. Using commercially available centrifuge, REMI 8C, collected blood was centrifuged immediately at 2800 rpm for 12 minutes according to Tunali's protocol^[13]. A fibrin clot was formed in the middle of the titanium tube. The plasma was collected in the upper part of the tube whereas the bottom part contained red corpuscles. The fibrin clot was collected as a colloid between the lower and upper parts of the centrifuged blood. The T-PRF clot was gently lifted with a sterile instrument and was placed between a two sterile gauze to obtain homogeneity of the membrane thickness.

A Kirkland flap operation was performed irt 46 in which full thickness flap was elevated and complete debridement of the defect site was performed. After ensuring that the entire granulation tissue along with the pocket epithelium was removed, root planing was done and the T-PRF was placed at the defect site. The flap was repositioned and coe-pack was placed after interrupted suturing was done with a 3-0 silk suture. Post operatively patient was asked not to brush at the surgical site and systemic antibiotics were prescribed. Amoxicillin 500 mg tid for 3 days, nonsteroidal anti-inflammatory drug i.e, diclofenac sodium bid for 3 days was prescribed. Patient was asked to resume to normal brushing after 2 weeks. 0.12% chlorhexidine rinse (twice a day for 4 weeks) was prescribed 24hrs after surgery. The surgical site also healed uneventfully. Suture removal was done after ensuring any uneventful healing of the surgical site after 7 days. Post-operative clinical and radiographic measurements were taken at 6 months follow-up. The entire surgical procedure was performed as depicted in Figure 1 to Figure 6

Figure-1 Pre Operative Radiograph Irt 46**Figure-2 Pre operative irt 46****Figure-3 Intra bony defect irt 46****Figure-4 TPRF membrane****Figure-5 Post operative radiograph irt 46****Figure-6 Titanium test tube**

In this report, the probing depth reduced from 8 mm to 4 mm and the CAL gain was 4mm at 6 months follow-up. To standardize the measurements, all the clinical measurements were made with UNC-15 probe and radiographs were taken by using a X-ray film holder by asking the patient to bite on the putty index that was prepared using acrylic resin.

DISCUSSION

In this case report TPRF was prepared using Mustafa Tunali's protocol at 2800 rpm for 12 minutes. The TPRF prepared has a homogenous matrix with a much thicker fibrin when compared to LPRF. The growth factors present are protected from being proteolyzed and thus increased time for releasing of growth factors at the defect site. TPRF also has an increased resorption time of around 18 to 21 days as opposed to 12 to 14 days in case of LPRF. TPRF was used based on the hypothesis to eliminate the possible hazardous effects of silica activated PRF in a glass test tube. In SEM analysis performed by Mustafa Tunali demonstrated that TPRF has highly organized network with continuous integrity compared to LPRF. The fibrin border between the cellular structures and the fibrin network were thicker and more pronounced in the T-PRF samples than in the L-PRF samples. TPRF, relatively covered a larger area when compared to LPRF^[13].

In this case report, the reduction in probing depth and gain in clinical attachment were assessed after 6 months of regenerative therapy. The radiographic evaluation has also shown a significant bone fill at the defect site. These are the important clinical parameters for assessing periodontal regeneration.

CONCLUSION

According to the results obtained there was significant improvement in alveolar bone level and that TPRF can be used as an alternative to PRF for periodontal regeneration. However, multicentred randomized clinical trials with sufficient sample size are required to know its clinical outcomes on periodontal regeneration. Alongside the capability of TPRF to eliminate the possible side effects of silica activated PRF in glass test tubes, the properties of improved fibrin meshwork i.e. thick and long fibrin meshwork, increased resorption time and relatively less expensive make it eligible for using it in periodontal regeneration in our daily practice.

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