



“LASEPRF”- LASER TREATED PRF FOR TREATMENT OF MULTIPLE GINGIVAL RECESSIONS - A CASE REPORT

Keerthi.K.L¹, P.Aravind Kumar², M. Narendra Babu³, K.Raviraj⁴

¹ Post graduate, St Joseph Dental College, Duggirala, Eluru.

² Professor, St Joseph Dental College, Duggirala, Eluru.

³ Professor, St Joseph Dental College, Duggirala, Eluru.

⁴ Sr.Lecturer, St Joseph Dental College, Duggirala, Eluru.

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Corresponding author: Keerthi.K.L.

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Abstract

Treatment of gingival recession has become an important therapeutic issue due to increasing cosmetic demand. Multiple surgical procedures have been developed to obtain predictable esthetic root coverage.. Low level laser therapy (LLL) has biostimulative effect on platelets by inducing platelet degranulation. Therefore, it can be possible that the use of Platelet rich fibrin (PRF) treated with LLLT could help in increasing the concentration of growth factors in the wound healing, thus accelerates healing process. This paper reports the use of PRF treated with laser for root coverage on the labial surfaces of the maxillary right teeth.

Keywords: Low level laser therapy (LLL), Platelet rich fibrin (PRF), Modified VISTA technique.

Introduction

Gingival recession is defined as apical migration of gingival margin beyond the cemento-enamel junction (CEJ)¹. Periodontal plastic surgery procedures aimed at coverage of exposed root surfaces with routine treatment modalities. The main indications for root coverage procedures are esthetics, dentin hypersensitivity, cervical abrasion, enhancement of restorative procedures and facilitation of plaque control. Among them, traumatic tooth brushing and tooth malpositioning have been related frequently to cause gingival recession². The goal of periodontal therapy is to protect and maintain the patient's natural dentition over lifetime for optimal comfort, function and esthetic appearance. Therefore, marginal gingival recession should not be viewed as merely a soft tissue defect, but rather as the destruction of both soft and hard tissue.

Since mid 20th century, various techniques have been developed to cover denuded roots. Different surgical techniques are suggested to treat gingival recession and each technique has its pros and cons³. Surgical treatment in multiple recession defects can be done but they are technique sensitive and wound healing is unfavourable.

To avoid these complications in treatment procedures, the vestibular incision subperiosteal tunnel access (VISTA) approach has been introduced

Platelet concentrates and low-level laser therapy (LLL) are recent treatment modalities in tissue regeneration which favour faster wound healing due to its biostimulatory effect on fibroblast, and blood vessels⁴. Blood platelets are known to be extremely sensitive cells, and their exposure to different stimuli (Laser) undergo rapid changes leading to their activation (platelet degranulation)⁵. Some studies demonstrated LLLT induces platelet degranulation and the release of substances stored in the alpha granules. Therefore, it can be possible that use of PRF treated with LLLT could help in increasing the concentration of Growth Factors in the wound healing, thus accelerates healing process¹.

In the case described in this article, platelet rich derivative (PRF membrane) was treated with low level laser therapy (LLL) and combined with “button pouch technique” to treat gingival recession.

CASE PRESENTATION

A 35-year-old male patient reported to the Department of Periodontology and Oral Implantology, St Joseph Dental College with the chief complaint of receding gums in the upper right back teeth region. On intraoral examination, an isolated Miller Class I gingival recession at the labial surface of the upper right canine, first premolar, second premolar and first molar (number 13,14,15,16) was present due to the faulty tooth brushing habit of the patient (Figure 1) . Recession was

3.5 mm, 4 mm, 4 mm in right central incisor, lateral and canine respectively and is recorded with the help of UNC 15 probe which is measured from the mid buccal point of cementoamel junction (CEJ) up till the gingival margin. Intraoral periapical radiograph showed no bone loss. The patient underwent basic periodontal treatment of Phase I therapy including scaling and root planing and oral hygiene instructions were given.

Surgical treatment of gingival recession was planned once the patient was able to maintain full mouth bleeding score of <20% and full mouth plaque score of <20% along with the absence of plaque.

The surgical site was anaesthetized and the VISTA technique implemented with a vestibular access incision mesial to the recession defect (Figure 2). Subperiosteal tunnel was created and it was extended at one tooth beyond the tooth requiring root coverage so as to mobilize gingival margins and facilitate coronal repositioning with microsurgical periosteal elevator. Additionally, the subperiosteal tunnel was extended interproximally with the help of elevator under each papilla as far as the embrasure space permits, without making any surface incisions through the papilla (Figure 3)



Figure 1:



Figure 2:



Figure 3:

Platelet rich fibrin is used in the surgery to enhance the healing and regeneration of the tissue. Prior to surgery, 10ml of intravenous blood (from the antecubital vein) is collected in a sterile tube without anticoagulant and centrifuged immediately at 2700 rpm for 12 min. After centrifugation, three layers are formed which comprise of red blood cells (RBC) base at the bottom, acellular plasma (platelet-poor plasma) as supernatant and platelet rich fibrin clot in the middle. Sterile tweezers were used to extract the PRF clot from the tube. It is separated from the RBC base using sharp scissors, and placed in a dappen dish (Figure 4). To obtain an inexpensive autologous fibrin membrane the clot is mashed between two gauze piece. It was then treated with low-level laser (LLL) using diode laser of wavelength 940nm for 60s, in pulsed non contact mode at 0.1W with diffused irradiation (Epic 10, BIOLASE) (Figure 5). Further, it is shaped easily with scissors and used in this procedure (Figure 6).



Figure 4:

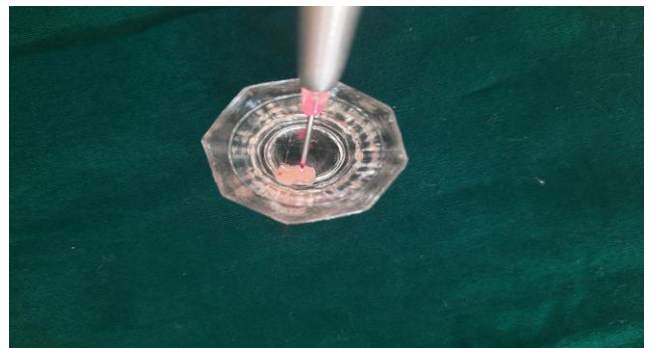


Figure 5:



Figure 6:

Mucogingival complex along with the platelet rich fibrin were then coronally advanced and sutured at approximately 2 to 3 mm apical to the gingival margin of each tooth. The suture was then tied to position the knot at the mid coronal point of the facial aspect of each tooth, which was secured with help of orthodontic buttons bonded with composite resin to prevent apical relapse of the gingival margin during initial stages of healing (Figure 7). Periodontal dressing was placed over the surgical area.



Figure 7:

Patients were placed on 0.12% chlorhexidine digluconate mouthrinse for four weeks. Systemic antibiotics were prescribed and advised to follow routine post-operative periodontal mucogingival instructions. Suture removal done after one week and the healing was uneventful (Figure 8).



Figure 8:

Healing:

Post-operative follow up was done after one month. In this case, there was no post-operative complication and healing was satisfactory. The patients did not have any post-operative morbidity. Complete coverage was achieved six months after the procedure, with excellent tissue contour and contour.

Discussion:

Apical migration of gingival margin is called as gingival recession. Exposed roots besides being unaesthetic also causes additional problem like dentinal hypersensitivity, pulpal hyperemia, dental caries⁶. Hence root coverage has become a very important procedure in periodontics today.

There are various techniques employed for root coverage procedure such as free gingival autograft, pedicle graft, coronally advanced flap, semilunar flap, subepithelial connective tissue graft, guided tissue regeneration technique, pouch and tunnel technique, etc. These techniques employ intrasulcular incisions which causes tissue trauma to the sulcular epithelium and leads to unfavorable healing and it is also technique sensitive⁷.

So in order to overcome the shortcoming of those techniques, a minimally invasive technique called "modified vestibular incision subperiosteal tunnel access (VISTA)" is presented in this case report which affords a number of advantages in treating gingival recession defects. In this technique, single vestibular incision can provide access to the underlying alveolar bone and reduces the possibility of traumatizing the gingiva of the teeth being treated.

PRF has been used in various fields of medical and dental due to its organized fibrin matrix with platelet and leukocyte concentrates below the matrix, having ability to release growth factors to promote wound healing, bone regeneration, graft stabilization, and hemostasis⁸. In recent years, lasers have been used to accelerate wound healing. LLLT has shown to cause vasoactive effect by supplying direct biostimulative light energy to the cells causing relaxation of smooth muscle associated with endothelium bringing vasodilation, thus allowing oxygen flow and immune cells into tissue contributing to accelerated healing⁹.

Studies have shown that within the power density range of 0.45 to 60 J/cm² of specific wavelength, LLLT can stimulate fibroblast proliferation¹⁰. More importantly, it also shows the effect on cytoskeleton structures like collagen. Studies have suggested that LLLT can improve wound healing by modulating the rearrangement of cells and stimulate cell proliferation.

The effects of laser light on platelet activation and platelet clumping are nonlinear, showing activation effect and maximal alterations in platelet activation and reactivity at low and moderate applied laser light energies. Some studies demonstrated LLLT induces platelet degranulation and the release of substances stored in the alpha granules. Therefore, it can be possible that the use of PRF treated with LLLT could help in increasing the concentration of growth factors in the wound healing, thus accelerates healing process. This hypothesis is supported by Nagata et al. who conducted a study on animals to analyze the effect of LLL with or without PRF on healing of a periodontal defect, where he found that LLL/PRF shows a positive effect on healing. El-Hayes et al. showed LLLT having a positive local biostimulative effect in the early stage of healing with PRF in the treatment of intrabony periodontal defects and postulated that the combination of both LLLT and PRF as treatment modalities could induce bone formation in the bone defect more than that of LLLT or PRF alone¹¹. Pugliese et al. in their experimental animal study determined the effect of LLL on the tissue collagen and found increased deposit of collagen¹². Singh AK et al used platelet rich fibrin reinforced periosteal pedicle graft with vestibular incision subperiosteal tunnel access technique for the coverage of exposed root surface and attained 84.6% of the root coverage. Significant improvement during the early periodontal healing phase with 96% root coverage is seen with VISTA technique along with PRF in a recent 12 month study. Ready SP et al used PRF with VISTA technique and obtained 100% root coverage in millers class I recession.

In this present case report using LLLT treated PRF combined with button pouch technique satisfactory root coverage was obtained after 4 months.

Conclusion:

Many treatment options are available to treat multiple recession defects but they are technique sensitive and it is very difficult to get the success rate as compare to

single defect. Clearly, long-term follow-up with clinical and histological studies will be required to obtain more information about the Low Level Laser(LLL) treated PRF-reinforced for coverage of exposed root surface and to obtain the predictability of this technique.

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