Case Report

Efficacy of low-level laser therapy as an adjunct to button anchored coronally advanced flap for gingival recession: A Doppler study

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Abstract:
Coverage of the exposed root is one of the periodontal plastic surgical procedures, which is one of the important periodontal treatment modalities. The introduction of innovation in new interdisciplinary treatment modalities has allowed us the use of orthodontic button in root coverage procedures using a coronally advanced flap (CAF) to provide the initial stabilization. This case report also evaluates the effectiveness of low-level laser therapy (LLLT) to detect the microvascular blood flow changes in the gingiva and alveolar mucosa where LLLT has been given after button-anchored CAF procedure during postoperative healing to detect blood flow changes of mucosa where LLLT was not given in other surgical sites. Three-month postoperative results showed that the LLLT used as an adjunct to CAF with the orthodontic button for stabilization is an effective surgical approach in the management of Miller’s Class I recession defects.

Key words:
Coronally advanced flap, Doppler, gingival recession, orthodontic button

INTRODUCTION

Gingival recession designates the root exposure, in which the gingival margin (GM) is displaced apical to cement-enamel junction. Effective management of gingival recession reduces the root sensitivity and improves the esthetics.[1] Coronally advanced flap (CAF) is the most commonly used mucogingival procedure to attain coverage of the exposed roots.[2] Several authors used CAF by repositioning the available gingiva in the coronal direction[3] or in combination with soft-tissue grafts such as free gingival graft or a connective tissue graft[4] or with guided tissue regeneration membranes, based on the principles of Melcher.[5] Common periodontal plastic surgical techniques used for the management of multiple adjacent recession defects are modified CAF technique,[6] modified CAF combined with a subepithelial connective tissue graft (CAF + SCTG),[7] or CAF with and without vertical releasing incisions.[8]

One of the major challenges faced following CAF procedure is the instability of the coronal portion of repositioned GM during early healing period. The introduction of innovation in new interdisciplinary treatment modalities has allowed us the use of orthodontic button in root coverage procedures using a CAF to provide the initial stabilization. In our case report, we have used orthodontic buttons to maximize the stabilization of the flap location during the immediate postoperative healing phase.

In the last decade, applying lasers as an adjunctive to mechanical treatment is the norm in the alleviation of gingival inflammation. Among laser applications, LLLT is advised for its pain-reducing, anti-inflammatory effects and wound healing promoter. LLLT alters cellular behavior by affecting the membrane calcium channels or mitochondrial electron transport chain, and it can also help in synthesis of collagen, release of growth factor, and angiogenesis, which accelerate wound healing. There are few in vivo studies that evaluate LLLT as an adjunct to conventional periodontal treatment.

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Doppler flowmetry (DF) is one of the noninvasive methods, used widely to study the microcirculation in skin. Doppler ultrasound is usually helped to determine the blood flow within the gingival vessels. It is either blue or red denotes the vascularity of the targeted site and color denotes whether blood movement is toward ultrasound probe (red) or away (blue) from it. In the field of dentistry, the DF has been used to detect the effect of periodontal disease, periostial stimulation, and smoking on gingival blood flow. This case report showed the comparison of microvascular blood flow changes in the alveolar mucosa where LLLT has been given after button-anchored CAF procedure during postoperative healing versus gingival blood flow changes of mucosa where LLLT was not given in other surgical sites.

CASE REPORT

A 30-year-old female patient came to the Department of Periodontology, with the complaint of receding gums for 2 months and also complaints of sensitivity in the upper front teeth region for 3 months. Complete case history reveals that the patient was systemically healthy, nonsmoker, and not taking any medication. On clinical and radiographic examination, Miller’s Class I recession of 3 mm was diagnosed in relation to 14 and 24 [Figure 1]. The gingival recession, probing depth, and clinical attachment level were assessed using a William’s periodontal probe. Orthodontic buttons were bonded to the midfacial aspect of 14 and 24 using flowable composite before starting with surgical procedure.

Surgical procedure

The first step to success is a painless procedure, and therefore, local infiltration was given in relation to 14 and 24 region using local anesthesia (xylocaine with 2% adrenaline). Followed by orthodontic button fixation, a mucoperiosteal flap was reflected by submarginal incision together [Figure 2] with intrasulcular incision on mesial and distal aspect of recession margins in 14 and 24 region [Figure 3]. The flap was stabilized at a coronal level for 2–3 min and the sling sutures with 4-0 black silk suture using orthodontic button was placed, as an anchorage to hold the CAF in position in 14 and 24. It also allowed stabilization of the papillae in the interdental connective tissue beds [Figure 4]. This also helped in the good adaptation of the gingival flap margin with the convexity of the existing anatomic crowns. Laser therapy was initiated just after sutures in the right side (14 tooth) alone in five points, and it was performed with diode laser that emits 810 nm wavelength, for 100 mW was used for 20 s [Figure 4]. Noncontact mode laser application was used and the probe tip was perpendicular to gingival tissue. Three points of irradiation (mesial, center, and distal of labial gingiva) were used at 1 mw for 20 s used. A periodontal dressing was placed over the surgical area to avoid frictional forces and any external trauma. After laser therapy was completed, alterations in blood flow during the immediate wound healing period were recorded in both sites by DW in 3rd day, 5th day, and 7th day followed by surgery [Figures 5-7]. The pack was removed as Doppler probe must contact the targeted mucosal site to receive the red blood cell movements.

Postoperative instructions were given, and the patient was instructed to avoid brush and floss at the surgical site and also use soft or semisolid diet during the 1st week of surgery. Antibiotics, analgesics for 5 days were prescribed to the patient. It was also advised to the patient to use mouth rinses twice daily with 0.2% chlorhexidine digluconate mouthwash for the first 15 days. The sutures, button, and periodontal dressing were removed from 14 to 24 region after 15 days of the surgery. The patient was advised to maintain oral hygiene, especially at the surgical area after removal of sutures 3 weeks postoperatively. The patient was evaluated at 1st week and at 3rd month [Figure 8] postoperatively. Uneventful healing and sufficient amount of root coverage were observed during recall.

DISCUSSION

The adhesion of the blood clot to the root surface is very important in the initial healing process. Tensile strength and stability of the wound are provided by thin clot. The precision of the surgical technique and initial postoperative healing without much movement of the surgical area are the main consideration of success. The vertical releasing incisions provide stability to the flap, but it has certain disadvantages such as damage to lateral blood supply. It has also been reported that there is less increase in apicoconal width of keratinized gingiva because vertical releasing incisions delay or disturb the alignment of mucogingival junction. To avoid these limitations of vertical incisions, flap was stabilized using the button as an anchorage with the help of sling sutures. Oblique submarginal incisions in CAF mimicked papilla shape and gained effective repositioning of papilla over deep epithelialized papillae. More apical split thickness flap elevation decreases the possibility of flap perforation. Envelope type of CAF provided good color and contour match of gingiva. It avoids the need for second surgical site for graft harvesting for regeneration. Orthodontic buttons are commonly used by an orthodontist as an inactive component to provide a strong bond for the attachment of accessories such as elastics. Orthodontic button as a passive component for holding sutures so as to provide maximum stability to flap in coronally displaced position during 2 weeks of wound healing. In this case report, the orthodontic button has been used for the reason to hold the CAF in coronal position and also against gravitational pull; hence, this procedure is not advised in mandible for the same reason.

Root coverage, aesthetic appearance, and patient compliance were well satisfied in LLLT site. LLLT with 810 nm wavelength showed an increase in DNA synthesis and also upregulates the production of ATP in cellular metabolism. Increase in fibroblastic proliferation and early formation of granulation tissue are also observed. LLLT also accelerates the healing process by increased growth factor production, increased cell proliferation, cell motility, and increased extracellular matrix deposition and thus decreases inflammation and leads to less edema. It is the diode laser helped in healing as low-level laser stimulates fibroblast for faster regeneration of soft tissue by greater secretion of basic fibroblast growth factor, early epithelization, leukocytic infiltration, and neovascularization are seen using LLLT.

Doppler is one of the noninvasive methods to monitor the response to periodontal therapy. This Doppler study
results indicated good vascularization in LLLT site than other sites, and hence it aids in increased wound healing and thus this combined procedure resulted in ideal root coverage, perfect color matching with the adjacent soft tissue, and excellent recovery of presurgical marginal morphology.

CONCLUSION

Techniques to achieve expected results in healing in root coverage procedures are uncommon; one among them is using the LLLT as an adjunct to button anchored coronally advanced procedure. This approach of using LLLT is very helpful in achieving desirable results in root coverage procedures as it accelerates the wound healing immediately after surgical procedure. Three-month results of the present case report are very promising in terms of clinically as well as patient-centered parameters. However, there is a real need for longitudinal clinical studies using larger patient groups to assess whether these initial positive results are modified with time.
Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Wennstrom JL. Mucogingival surgery. In: Lang NP, Karring T, editors. Proceedings of the 1st European Workshop on Periodontology, London: Quintessence Publishing, 1994. p. 193-209.
2. Chambrone L, Faggion CM Jr., Pannuti CM, Chambrone LA. Evidence-based periodontal plastic surgery: An assessment of quality of systematic reviews in the treatment of recession-type defects. J Clin Periodontol 2010;37:1110-8.
3. Prato GP, Clauser C, Magnani C, Cortellini P. Resorbable membrane in the treatment of human buccal recession: A nine-case report. Int J Periodontics Restorative Dent 1995;15:258-67.
4. Matter J. Free gingival graft for the treatment of gingival recession. A review of some techniques. J Clin Periodontol 1980;7:103-17.
5. Tinti C, Vincenzi G, Cocchetto R. Guided tissue regeneration in mucogingival surgery. J Periodontol 1993;64:1184-91.
6. Zucchelli G, De Sanctis M. Treatment of multiple recession-type defects in patients with esthetic demands. J Periodontol 2000;71:1506-14.
7. Allen AL. Use of the supraperiosteal envelope in soft tissue grafting for root coverage. II. Clinical results. Int J Periodontics Restorative Dent 1994;14:302-15.
8. Zabalegui I, Sicilia A, Cambra J, Gil J, Sanz M. Treatment of multiple adjacent gingival recessions with the tunnel subepithelial connective tissue graft: A clinical report. Int J Periodontics Restorative Dent 1999;19:199-206.
9. Pini-Prato G, Baldi C, Pagliaro U, Nieri M, Saletta D, Rotundo R, et al. Coronally advanced flap procedure for root coverage. Treatment of root surface: Root planning versus polishing. J Periodontol 1999;70:1064-76.
10. Hwang D, Wang HL. Flap thickness as a predictor of root coverage: A systematic review. J Periodontol 2006;77:1625-34.
11. Grover HS. Button-assisted coronally advanced flap: Reclaiming the ground lost to gingival recession. Clin Dent 2014;8:15-9.
12. Wikesjö UM, Nilvéus RE, Selvig KA. Significance of early healing events on periodontal repair: A review. J Periodontol 1992;63:138-65.
13. Ozcelik O, Haytac MC, Seydaoglu G. Treatment of multiple gingival recessions using a coronally advanced flap procedure combined with button application. J Clin Periodontol 2011;38:572-80.
14. Karu T. Photobiology of low-power laser effects. Health Phys 1989;56:691-704.
15. Hinrichs JE, Jarzembski C, Hardie N, Aeppli D. Intrasulcular laser Doppler readings before and after root planing. J Clin Periodontol 1995;22:817-23.