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RESEARCH ARTICLE

ROOT COVERAGE BY CORONALLY ADVANCED FLAP WITH AND WITHOUT PLATELET-RICH FIBRIN: A CLINICAL STUDY

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ABSTRACT

Background: Marginal gingival recession can cause major functional and esthetic problems. Advanced flaps are the simplest, yet unpredictable procedures for managing these conditions. The predictability of root coverage can be increased by combining coronally advanced flap (CAF) or its modified approach with other regenerative techniques. **Objective:** To ascertain the potential benefits of platelet-rich fibrin (PRF) on modified CAF for the treatment of gingival recession. **Materials and Methods:** Study comprised of 12 patients with Millers' class I and class II gingival recession in two non-adjacent anterior teeth having a minimum 3 mm width of attached gingiva. Following split-mouth design, one tooth with gingival thickness (GT) were recorded at baseline, 1 month, 3 months, and 6 months. **Results:** VGRD, GRW, CAL, and GT improved significantly from baseline to 1 month in both test and control groups. However, change in these parameters from 1 month to 3 months and 3 months to 6 months were statistically non significant in both groups. On intergroup comparison, only the change in GT was found to be statistically significant ($P < 0.05$) at all three post-treatment visits. gingival recession was subjected to CAF, while another was treated by CAF with PRF. The clinical parameters, i.e., plaque index, modified sulcular bleeding index, vertical gingival recession depth (VGRD), gingival recession width (GRW), clinical attachment level (CAL), and gingival thickness (GT). **Conclusion:** Benefits of the combined technique in terms of increased GT appear to justify the use of PRF along with modified CAF for the treatment of mild to moderate gingival recessions.

INTRODUCTION

Gingival recession is as great an esthetic problem as it is a periodontal concern. It has been clinically related to a higher incidence of root caries, attachment loss, and hypersensitivity (Kassab, 2003). Various root coverage procedures have been successfully performed to correct this common periodontal problem. However, achieving a predictable outcome of such procedures is still a challenge for periodontists. Pedicled flaps are probably the simplest procedures for managing gingival recession. Norberg first proposed coronally positioned flap in 1926 as an esthetic surgical procedure for root coverage (Maynard, 1977). Optimum root coverage, good color blending of the treated area with adjacent tissues, and complete recovery of original soft tissue morphology can be accomplished by this procedure. Although being less predictable in terms of successful outcome, the postoperative healing in pedicled flaps is less troublesome for the patient when compared to free gingival grafts.

However, it appears that CAF alone is a less than optimal technique to achieve root coverage despite its advantage of low morbidity. The predictability can be increased by combining CAF with other techniques which may involve the use of connective tissue graft, enamel matrix derivative, synthetic allograft, platelet-rich plasma, and platelet-rich fibrin (PRF). PRF is a second generation platelet concentrate. It is prepared as a single fibrin membrane, containing constituents of blood which are favorable for healing and immunity (Harris, 1994). PRF consists of a fibrin matrix polymerized in a tetra-molecular structure with incorporation of platelets, leucocytes, cytokines, and circulating stem cells (Zucchelli, 2000). The aim of this study was to compare the clinical outcomes obtained with the CAF alone or in combination with PRF in the management of mild to moderate gingival recession. Study comprised of 12 adult patients (age, 18–50 years) of either sex with localized chronic periodontitis who met the inclusion criteria and agreed to sign the informed consent.

The patients were selected randomly from the Outpatient Department of Periodontics based on the following inclusion criteria:

- Miller's Class I or II gingival recession with depth ≥ 2 mm on at least two nonadjacent anterior teeth.
- Selected teeth were ensured to have a minimum 3 mm width of attached gingiva (WAG), measured from the most apical extension of gingival margin to the mucogingival junction. Periapical radiographs were taken to check the levels of interproximal bone, which were then correlated with clinical findings to confirm the diagnosis of Miller's Class I or II recession defect.

Exclusion criteria: Included generalized chronic periodontitis and aggressive periodontitis, malaligned teeth, Miller's class III and IV gingival recession defects, teeth with class V carious lesion or restoration, and current or former smokers. Pregnant or lactating women or those planning a pregnancy or having systemic conditions such as uncontrolled diabetes mellitus which could have modified the outcome of the treatment were also excluded. Following the screening examination, all patients received a session of phase I periodontal therapy including oral hygiene instructions. They were trained in sulcular brushing technique. Surgical treatment was not scheduled until the patient could demonstrate an adequate standard of plaque control (full mouth plaque index (PI) < 1). Following clinical measurements were recorded on the day of surgery: PI (Sillness and Loe), mSBI (Mombelli *et al.*), VGRD, measured from the Cementoenamel junction (CEJ) to the gingival margin at mid-facial point, GRW measured at the CEJ, width of attached gingiva (WAG) measured from free gingival groove to mucogingival junction (MGJ), CAL, measured from the CEJ to the base of gingival sulcus, GT, measured at midfacial point, 3 mm below gingival margin after making a customized acrylic stent of the patient.

Surgical procedure: The area to be operated was anesthetized using 2% lignocaine with 1:200,000 adrenaline by mucosal infiltration. A sulcular incision was made at the gingival margin including mesial and distal papillae with two slightly divergent incisions at the end of the sulcular incision extending into the alveolar mucosa. A coronal full-thickness flap was raised up to mucogingival junction followed by apical split thickness flap. All muscle fiber insertions present in the flap were eliminated. The root surface was planed with the Gracey curettes. Coronal mobilization of the flap was done till the marginal portion of the flap was able to passively reach a level up to the CEJ and the flap was stable in its final coronal position even without sutures. In test group, PRF was prepared by taking 5 ml of patient's blood from median cubital vein in a 6 ml vacuum container, followed by centrifugation at 2700 rpm for 12 min. Out of three different layers obtained on centrifugation, middle layer of PRF was taken out, and membrane was prepared from it by squeezing it between two pieces of moist gauze. PRF was placed over the recession defect just apical to CEJ. Flap was adapted at the CEJ and secured using sling sutures. Vertical releasing incisions were closed with 4-0 resorbable interrupted sutures followed by placement of periodontal dressing

Postoperative protocol: Patients were advised to take soft diet and to avoid biting on the operated site for 2 weeks. They were also instructed to avoid brushing in the operated area for 2 weeks. Chlorhexidine mouth rinse (0.2%) and

ibuprofen 400 mg tablets were prescribed twice daily for 1 week. Postoperative healing was uneventful. Periodontal dressing was removed 1 week after surgery, while sutures were removed after 2 weeks. Patients were then instructed to gently brush the operated area using Charter's technique for the next 1 month.

RESULTS

Mean values of clinical parameters at baseline, 1 month, 3 months, and 6 months between Test and Control group CAF (control group)

CAF + PRF (test group)

COMPARISON OF MEAN VALUE CHANGES IN CLINICAL PARAMETERS AT 1, 3 & 6 MONTHS BETWEEN TEST & CONTROL GROUPS

| Parameter | 1 month | | | Baseline (mean±SD) | | | 3 months | | | 6 months | | |
|-----------|-----------|-----------|--------|--------------------|-----------|--------|-----------|-----------|--------|-----------|-----------|--------|
| | CAF | CAF + PRF | P | CAF | CAF + PRF | P | CAF | CAF + PRF | P | CAF | CAF + PRF | P |
| mSBI (mm) | 0.06±0.11 | 0.00±0.00 | 0.069 | 0.04±0.10 | 0.06±0.11 | 0.633 | 0.06±0.16 | 0.04±0.14 | 0.067 | 0.06±0.16 | 0.04±0.14 | 0.067 |
| VGRD (mm) | 0.93±0.16 | 0.96±0.14 | 0.687 | 0.85±0.23 | 0.87±0.21 | 0.819 | 0.85±0.23 | 0.82±0.20 | 0.794 | 0.85±0.23 | 0.82±0.20 | 0.794 |
| GRW (mm) | 3.91±0.90 | 4.00±0.95 | 0.828 | 3.75±0.87 | 3.83±0.96 | 0.823 | 3.58±1.16 | 3.67±1.07 | 0.857 | 3.58±1.16 | 3.67±1.07 | 0.857 |
| CAL (mm) | 0.58±0.10 | 0.59±0.16 | 0.879 | 0.53±0.13 | 0.54±0.18 | 0.895 | 0.53±0.13 | 0.53±0.16 | 0.924 | 0.53±0.13 | 0.53±0.16 | 0.924 |
| GT (mm) | 0.11±0.17 | 0.62±0.24 | 0.017* | 0.18±0.28 | 0.61±0.30 | 0.015* | 0.12±0.19 | 0.61±0.31 | 0.013* | 0.12±0.19 | 0.61±0.31 | 0.013* |

*Statistically significant. CAF=Coronally advanced flap, PRF=Platelet-rich fibrin, SD=Standard deviation, mSBI=Modified sulcular bleeding index, VGRD=Vertical gingival recession depth, GRW=Gingival recession width, CAL=Clinical attachment level, GT=Gingival thickness



Vertical gingival recession depth



PRF membrane placed at the recession site



Coronally advanced flap



Sutures Placed

DISCUSSION

CAF is a simple technique for management of gingival recession. Varying outcome of this technique has been reported widely in the literature. The present study showed significant improvement in VGRD, from baseline to 6 months in both groups, similar to many previously reported data (Huang, 2005; Bernimoulin, 1975; Pini-Prato, 2012). Gain in CAL in both groups also confirms the findings of previous studies (de Sanctis, 2007; Allen, 1989; Pini-Prato *et al.*, 2005; Tenenbaum, 1980; Aroca, 2009) studies regarding the healing of pedicled grafts (e.g., CAF or rotational flap) have shown mixed results which varied from complete long junctional epithelial attachment to partial connective tissue attachment in the apical part and epithelial adaptation in the coronal part (Ainamo, 1976). In the present study, however, exact nature of reattachment could not be known as histologic evaluation of new attachment apparatus was not done. Combination of full and split flap design has several advantages. Coronal full thickness portion that includes the periosteum confers more thickness and thus better predictability of root coverage, while apical split thickness flap elevation facilitates the coronal displacement of flap (de Sanctis, 2007).

Most of the earlier techniques of CAF utilized coronal displacement of flap through periosteal incisions, to eliminate the muscle tension on the flap (Allen, 1989; Wennström, 1996). In the present modified technique, coronal displacement was allowed through elimination of muscle insertions as reported by de Sanctis and Zucchelli (de Sanctis, 2007) This technique provided simultaneous advantages of eliminating the tension on flap as well as permitting passive displacement of flap till CEJ without sutures because of the absence of the muscle pull, thus achieving the better and stable root coverage. In the present study, most striking outcome was a clear trend toward an increased thickness of the gingiva at the test sites. This intergroup difference was statistically significant at all 3 posttreatment visits. The clinical benefit of such improvement in thickness is however controversial⁽¹⁵⁾ it was suggested that gingiva with a thin biotype at sites with alveolar bone dehiscence may serve as a locus minoris resistentia to develop soft tissue recessions (Wennström, 1987) However, even if thick tissue appears to improve clinical results, a systematic review by Hwang and Wang failed to establish conclusively, any requirement for a minimum thickness (Hwang, 2006). The increase in GT may be attributed to proliferation of gingival and periodontal ligament fibroblasts under influence of growth factors from PRF or to a spacing effect of the PRF membrane. It is yet to be investigated if the additional gain in GT that we found in our test group after 6 months is of clinical value

and/or is associated with an improved esthetic outcome in long term. Results of the present study for treatment of single tooth gingival recessions by CAF indicated that only benefit of the addition of PRF appears to be a significant increase in the thickness of gingiva which may improve the predictability and long-term maintenance of achieved soft tissue root coverage.

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