Clinical Application of Modified Apically Repositioned Flap in Class III/IV Gingival Recession Cases

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ABSTRACT

Aim: Mucogingival conditions may be detected during a comprehensive or problem-focused periodontal examination. The aim of periodontal therapy is to help maintain the dentition or its replacements in health with good function and esthetics, and may include restoring anatomic form and function. A further goal is to reduce the risk of progressive recession. Among the procedures, root coverage has attracted the most interest. A predictable gain can be achieved in class I or II recession cases, but prognosis tends to be poor for class III and IV. The purpose of this case series was to clinically evaluate the efficacy of modified apically repositioned flap in increasing the dimensions of the keratinized tissue in apical direction in class III or IV gingival recession.

Materials and methods: A total of seven systemically healthy patients with class III or IV recession involving one or more teeth in mandibular anterior region were selected for the study. Primary parameters assessed were width of keratinized gingiva and pocket depth.

Results: The mean apicocoronal gain in the keratinized tissue at 6 months was 2.14 mm with mean baseline value of 1.43 mm and 6 months value at 3.57 mm. The clinical gain was statistically significant with p-value <0.05.

Conclusion: Modified apically displaced flap offers an easy and predictable approach for increasing the width of keratinized tissue.

Keywords: Attached gingival, Gingival recession, Labial frenum.

INTRODUCTION

Mucogingival conditions are deviations from the normal anatomic relationship between gingival margin and mucogingival junction (MGJ). Common mucogingival conditions are recession, reduced or absent keratinized tissue, and probing depth beyond the MGJ. Anatomical variations that may complicate the management of these conditions include tooth position, frenulum insertions, and vestibular depth.

Mucogingival conditions may be detected during a comprehensive or problem-focused periodontal examination. Problem-focused examination for mucogingival condition would involve medical examination, dental examination, intraoral findings, such as probing and visual examination, etiological factors, and radiographic examination. The aim of periodontal therapy is to help maintain the dentition or its replacements in health with good function and esthetics, and may include restoring anatomic form and function. A further goal is to reduce the risk of progressive recession. Among the procedures, root coverage has attracted the most interest. A predictable gain can be achieved in class I or II recession cases, but prognosis tends to be poor for class III and IV.

Class III and IV gingival recessions are complex cases with reduced width of keratinized tissue, interdental tissue loss, and frenulum involvement. Adequate width of attached gingiva is necessary to protect the periodontium and promote periodontal health. Carnio et al described a variation of modified apical repositioned flap (MARF) for augmenting the dimensions of attached gingiva on multiple adjacent teeth without recession and interdental tissue loss. The purpose of this case series was to clinically evaluate the efficacy of MARF in increasing the dimensions of the keratinized tissue in apical direction in class III or IV gingival recessions.

MATERIALS AND METHODS

All the study subjects were informed about the treatment options for the area presenting with mucogingival problem. Patients selected to undergo the surgical procedure gave informed consent.

A total of seven systemically healthy patients (four females and three males) were selected for the study. The treatment area in all the cases was mandibular anterior region with class III or IV recession involving

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one or more teeth. The age of patients varied from 31 to 42 years (average age of 35.5 years). The common complaint among all patients was their inability to clean the region, bleeding from gums, and increasing space between teeth.

All the patients underwent phase I therapy, and were reviewed biweekly for 8 weeks. A carefully planned home care oral hygiene protocol was explained to the patients. This included use of interdental brush twice daily. Baseline recording included width of keratinized gingiva, pocket depth, tension test, and bleeding from probing. Inclusion criteria included 0.5 to 2 mm of keratinized gingiva, physiological sulcus depth, and gingival tissue free of inflammation.

The surgical procedure was done under 2% lignocaine hydrochloride with adrenaline (1:80,000). A partial thickness horizontal beveled incision was made using a No. 15 BP blade 0.5 mm coronal to MGJ into the keratinized tissue. A partial thickness flap was raised apical to the initial incision extending at least one tooth on either side of defect region (Fig. 1). The lateral extension of the incision allowed for apical repositioning of the flap without the use of vertical release incisions. The coronal end of partial thickness flap was lined by 0.5 mm of keratinized tissue. The gingiva coronal to the initial incision remained intact around the teeth. At the base of the flap, a full-thickness incision was placed to release the flap from the muscular fibers and allow for maximum apical displacement. The flap was moved apically and secured to the periosteum with horizontal mattress sutures using 5-0 bioabsorbable suture material (Fig. 2). The surgical site was inspected for any loose tissue or frenal fibers. A thin and homogenous layer of periosteum with no movable tissue was considered the end point of the surgery. Postoperative instructions included use of 0.2% chlorhexidine gluconate mouthwash 10 mL twice daily for 4 postoperative weeks and use of analgesics (ibuprofen, 400 mg) as needed. Patients were advised not to retract the lip and rinse gently. Mechanical oral hygiene aids were avoided for 4 weeks postoperatively.

RESULTS
Pre- and postoperative measurements were recorded and statistically analyzed. All parameters were averaged and all tests were performed at the 5% significance level. \( p \)-value \( \leq 0.05 \) was regarded as statistically significant. The mean apicocoronal gain in the keratinized tissue at 6 months was 2.14 mm with mean baseline value of

Figs 1A to D: (A) Initial horizontal beveled incision placed in the keratinized gingival tissue; (B) apical displacement of partial thickness flap; (C) preoperative class IV gingival recession with secondary involvement of frenum in 31 to 41 region; (D) postoperative 9 months follow-up
1.43 mm and 6 months value at 3.57 mm. The clinical gain was statistically significant with p-value <0.05. No statistically significant difference in probing depth was detected pre- and postoperatively (Table 1).

Tension test was positive for all the cases at the baseline recording, and negative at 6 months follow-up. Sulcus bleeding index was used to assess the gingival bleeding in the lower anterior region. Average baseline score recorded at the end of phase I therapy was 3 and at 6 months, the score was 1.

**DISCUSSION**

A variety of techniques, such as pedicle grafts, free gingival autografts, connective tissue grafts, guided tissue regeneration, etc., have been used for the treatment of gingival recession. All these procedures have limited value in management of class III/IV gingival recession. In this study, MARF constituted an efficient and predictable modality of therapy to increase the apicocoronal dimensions of keratinized gingiva in class III/IV cases. The surgical procedure involves minimum morbidity and is cost-effective. The goal of therapy was to achieve more functional efficiency rather than cosmetic gain.

The surgical site shows uneventful healing as it is covered with periosteum. Postoperative inspection revealed granulation tissue at 72 hours and ingrowths of epithelium from margin of wound. None of the patients required analgesic from second postoperative day. At 4 week postoperatively, the surgical site was covered with tissue similar to adjacent tissue (Fig. 2). Three of the cases showed a fibrotic line demarcating the keratinized tissue from movable vestibular mucosa (Fig. 3).

The controversy in the literature regarding the necessity of a band of attached gingiva for maintenance of optimal periodontal health remains unresolved. While Lang and Löe suggested that 2 mm of gingiva is an essential prerequisite for periodontal health, Miyasato et al demonstrated that, with proper oral hygiene and absence of bacterial plaque, clinically

| Table 1: Comparison of primary outcome variables at baseline and 6 months |
|-----------------|------|-------|
| Keratinized gingiva | Mean | SD   | p-value |
| Baseline         | 1.43 | 0.53  | <0.05   |
| 6 months         | 3.57 | 0.53  |          |
| Pocket depth     | Baseline | 1.57 | 1.28  | >0.05   |
| 6 months         | 0.53 | 0.48  |          |

SD: Standard deviation
healthy gingiva can exist in areas with minimal or no attached gingiva. The average gain in the keratinized tissue in this case series was more than 2 mm, which is of clinical significance when assessed along with the gingival bleeding score. The cases selected in this case series underwent phase I therapy and were on homecare protocol, but on follow-up showed persistent gingival inflammation in the affected sites (sulcus bleeding score of 3). The sulcus bleeding score of 1 at 6-month follow-up shows clinically significant improvement in the periodontal health. No clinical changes were observed in the gingival recession and pocket depth at baseline and 6 months follow-up.

Presence of anatomical factors, such as aberrant frenum, muscle attachment, and gingival phenotype is also thought to contribute to the etiology of gingival recession. All the cases had aberrant frenulum, with positive tension test prior to surgery. Adequate care was taken to displace the frenum and muscle attachment apically to prevent postsurgical relapse. At 6 months, no aberrant frenulum attachments were noticed, resulting in negative tension test and improved periodontal health.

A full-thickness incision at the base of the flap released all the muscular attachments. The flap was sutured to periosteum below this incision, forming a boundary for surgical wound lined with keratinized epithelium all around. As studied by Karring et al., the main determining factor of the nature of the new tissue that develops over the exposed periosteum rests with the origin of granulation tissue cells that migrate over the wound. The surgical wound created by MARF is surrounded with keratinized tissue. This prevents nonkeratinized cells from oral mucosa proliferating onto the surgical area. The partial thickness incision prevents the exposure of crestal bone and hence, prevents bone loss.

The major limitation of the study is the small sample size and absence of control. A large-scale study with nonsurgical periodontal therapy forming the control is proposed at this center.

**CONCLUSION**

The predictable increase in the apicocoronal gingival dimensions with MARF offers considerable advantage over other mucogingival therapies. The procedure has minimum morbidity with no requirement for soft tissue graft, is cost-effective when compared with guided tissue regeneration or allograft, and has predictable color match to the adjacent tissue. Furthermore, the procedure is
simple and can be conducted expeditiously with limited chair time for operator and patient. A second-stage coronal advancement in these cases may be attempted for root coverage.

REFERENCES