



COMPARISON OF CORONALLY ADVANCED FLAP WITH A MODIFIED SEMILUNAR CORONALLY ADVANCED FLAP IN THE TREATMENT OF GINGIVAL RECESSION

Sumana N, Chakravarthy. Y.S.H.S, Anusha G, Susmitha CH, Harika P and Sravani B

Lenora Institute of Dental Sciences, Korukonda Road, Rajanagaram. India

ARTICLE INFO

Article History:

Received 6th December, 2021

Received in revised form 15th January, 2022

Accepted 12th February, 2022

Published online 28th March, 2022

Key words:

Gingival recession; Coronally advanced flap;
Modified semilunar coronally advanced flap.

ABSTRACT

Background: This study aimed to compare the clinical efficacy of Coronally Advanced Flap (CAF) with a Modified Semilunar Coronally Advanced Flap (MSCAF) in the treatment of Miller's class I and class II Gingival recession. **Materials and methods:** A double-blinded, simple, randomized, prospective, split-mouth clinical study with a total of 12 patients was segregated randomly into two sites. Site I was treated with coronally advanced flap technique. Site II was treated with modified semilunar coronally advanced flap technique. For each patient, both the sites Was recorded with clinical parameters. **Results:** In both sites, statistically significant changes in recession depth and clinical attachment level were seen from baseline to 24th week. No statistically significant difference was seen between the two groups at any time period. In site I, complete root coverage (CRC) was accomplished in five teeth (43.8%) with defects. In site II complete root coverage (CRC) was achieved in four teeth (33.3%) whose defect was treated. **Conclusion:** From the findings of this clinical investigation CAF or MSCAF can be utilised successfully to treat gingival recessions. For more accurate assessment of these techniques, more clinical trials are required.

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INTRODUCTION

Periodontal therapy has been directed towards to improve periodontal health and restore compromised function. However, with the increasing aesthetic concern of the patients, the dental surgeons are compelled to develop treatment strategies that would restore patient's confident smiles. Gingival recession is one of the most prevalent cosmetic concerns associated with periodontal tissues, prompting researchers to devise numerous techniques to treat it.

Periodontitis is an inflammatory condition of the teeth supporting tissues caused by individual or groups of microorganisms that leads to the gradual deterioration of the periodontal ligament and alveolar bone, culminating in periodontal pocket development, gingival recession, or both.¹

The most prevalent periodontal disease is gingival recession, where displacement of gingival marginal apical to the cemento-enamel junction leading to exposure of root surface seen.² Gingival recession mainly found on buccal or labial surfaces of anterior or posterior teeth.³ Gingival recession can be physiological and pathological, leading to esthetics and dentinal hypersensitivity problems.

Gingival recession can be treated by various procedures like free gingival graft, connective tissue graft, subepithelial connective tissue graft, coronally advanced flap, laterally moved flap and semilunar flap.

All these procedures improve esthetics, reduction of dentinal hypersensitivity, prevents root caries, and cervical wear.^{4,5} The coronally advanced flap technique is considered as gold standard in treating gingival recession.⁶ This approach, combined with a connective tissue graft, showed the highest rate of success in complete root coverage.⁷ However, the coronally advanced flap approach may result in the shallowing of vestibule and scarring in vertical incisions region, which affect the aesthetics of the anterior teeth.⁷ To overcome these disadvantages, simplified surgical techniques such as semilunar coronally advanced flap was proposed,⁸ but stability for semilunar coronally positioned flap without sutures and non-involvement of papilla have been questioned in the treatment of Miller's class I and class II gingival recession.⁸

Modified semilunar coronally advanced flap provides better control over semilunar coronally advanced flap and has advantages such as, uncompromised esthetics, prevent vestibule shallowing and higher percentage of root coverage.⁹ Modified semilunar coronally advanced flap in the treatment of Miller's class I and class II gingival recession may yield better results.

To the best of our knowledge, no studies in the literature compared modified semilunar coronally advanced flap and coronally advanced flap. So, the present study was designed to compare the clinical efficacy of coronally advanced flap with a modified semilunar coronally advanced flap in the treatment of gingival recession.

*Corresponding author: **Sumana N**

Lenora Institute of Dental Sciences, Korukonda Road,
Rajanagaram. India

MATERIAL AND METHODS

A double-blinded, simple, randomized, prospective, split-mouth clinical study was designed. A total of 24 sites from 12 patients were selected amongst the patients visited the Department of Periodontology, Lenora Institute of Dental Sciences for the study and were randomly divided by using the lottery method. Site I was treated with coronally advanced flap technique. Site II was treated with modified semilunar coronally advanced flap technique. The nature of the study was explained to all the patients, and a written informed consent form was obtained. Patients were included in the study after taking a case history, and haematological examination was done at baseline. For each patient, both the site I and site II was recorded with: a. Recession Depth (RD). b. Probing Depth (PD). c. Clinical Attachment Level (CAL) d. Keratinized Tissue Width (KTW). e. Complete Root Coverage (CRC) f. Dental Hypersensitivity (DS).

Subject selection Inclusion criteria

- Patients with age group 20-50yrs.
- Patients with Miller's class I and class II gingival recession in maxillary anterior and premolars.
- Patients with Miller's class I and class II gingival recession on the buccal side and shallow defect.
- Patients who maintain good oral hygiene.
- Patients willing to comply with all study related procedures, and those available for follow-up.

Exclusion criteria

- Patients who use tobacco in any form.
- Pregnant and lactating women.
- Patients having thin gingival biotype, prosthesis on adjacent teeth.
- Patients who had undergone periodontal therapy in the preceding 6 months.
- Patients who had a history of systemic disease.
- Patients who are unwilling for treatment.
- Patients with non-carious lesions.
- Non-vital teeth.
- Malposition teeth

METHODS

After recording all clinical parameters, scaling and root planing was done. After 2 weeks, intraoral antiseptics was done with 0.2% chlorhexidine digluconate rinse. Extraoral antiseptics was done using povidone iodine solution. Procedure was done under local anaesthesia.



Fig a pre-operative recession depth at site I

In site I (CAF): On the buccal surface of the affected tooth, an intrasulcular incision was performed using a 15 C surgical blade. At the level of the CEJ, two horizontal incisions were

made at right angles to the surrounding interdental papillae. To reduce muscle tension, two oblique vertical incisions were prolonged beyond the mucogingival junction. The adjacent papillae's epithelium was de-epithelized. Curettes were used to instrument the root surface, which was then irrigated with sterile saline solution. Suturing is used to secure the tissue flap at the level of the CEJ after it has been advanced coronally and modified for perfect fit to the prepared recipient bed.

In site II (MSCAF): the distance between bone crest and gingival margin was measured and the gingival recession depth + 3 mm was added to this parameter to know apical extension. A semilunar incision was made far enough apically. The incision was extended mesially and distally to the midline of the buccal aspect of the adjacent teeth. Oblique incisions were made on the basis of adjacent papillae from the CEJ of the tooth to be covered to the most apical portion of gingival margins of the adjacent teeth and will be continued with an intrasulcular incision. The partial thickness flap was advanced coronally until it could passively reach the CEJ of the compromised teeth and allow the adaptation of the newly created papillae on the previously de-epithelialized papillae. Releasing incisions were closed with sutures.

Patient was instructed to discontinue tooth brushing around the surgical sites during the initial 2 weeks after surgery. Suitable antibiotics, analgesics (500mg Amoxicillin thrice daily for 5 days and Aceclofenac twice daily for 3 days) and 0.2 % chlorhexidine solution mouth rinse twice daily was prescribed.



Fig b pre-operative recession depth at site I

Statistical Analysis

Statistical analysis of the data was performed by using Statistical Package for the Social Sciences (SPSS) software version 23 (IBM, Chicago, USA). All the values were subjected for statistical analysis by using ANOVA Test: One way Analysis of Variance is a way to test the equality of three or more means at one time by using variances. Independent sample t-test, used to test the significant difference between two means.



Fig c



Fig d



Fig e



Fig f



Fig g



Fig h

Fig c Incisions at site I d. Split thickness flap elevation at site I e. 4-0 silk sutures placed at site I f. Incision at site II g. Split thickness flap elevation at site II h. 4-0 silk sutures placed at site II

RESULTS

The following results were obtained

Recession depth

The mean RD at baseline, 24th week were 2.96± 0.66mm, 0.67 ± 0.685 mm, respectively for site I . It was found to be 2.88 ± 0.68mm, 0.58 ±0.42mm, respectively for site II (Table 1).

Intra group comparison (Table 1)

On intragroup comparison of RD from baseline to 24th week shows a significant reduction at both test site I and site II.

Intergroup comparison (Table 2)

Comparison of recession depth between the two groups from baseline to 24th week revealed a difference which was statistically not significant (p>0.05).

Table 1 Comparative analysis of clinical parameters at different time intervals

Clinical parameters	Groups	Observation Period	Mean±SD	P value
Recession depth	Site I	Baseline	2.96 ± 0.66	0.00001
		24 th week	0.67 ± 0.685	
	Site II	Baseline	2.88 ± 0.68	0.00001
		24 th week	0.58 ± 0.42	
Probing depth	Site I	Baseline	1.42 ± 0.51	0.00142
		24 th week	0.96 ± 0.26	
	Site II	Baseline	1.33 ± 0.39	0.011
		24 th week	0.96 ± 0.26	
Clinical attachment level	Site I	Baseline	4.375 ± 0.91	0.00001
		24 th week	1.58 ± 0.76	
	Site II	Baseline	4.20± 0.94	0.00001
		24 th week	1.58 ± 0.48	
Keratinized tissue width	Site I	Baseline	3.58 ± 0.60	0.00001
		24 th week	4.29 ± 0.54	
	Site II	Baseline	3.54 ± 0.62	0.00001
		24 th week	4.42 ± 0.56	
VAS Score	Site I	Baseline	5.33 ± 0.89	0.00001
		24 th week	3.25 ± 0.96	
	Site II	Baseline	2.96 ± 0.66	0.00001
		24 th week	0.67± 0.68	

Table 2 Intergroup analysis of clinical parameters at different time intervals

Clinical parameters	Sites	Observation Period	P value
Recession depth	Site I Site II	Baseline	0.38
		24 th week	0.36
Probing depth	Site I Site II	Baseline	0.33
		24 th week	0.5
Clinical attachment level	Site I Site II	Baseline	0.33
		24 th week	0.37
Keratinized tissue width	Site I Site II	Baseline	0.43
		24 th week	0.29
VAS Score	Site I Site II	Baseline	0.25
		24 th week	0.11

Probing depth

The mean PD at baseline, 24th week were 1.42± 0.51mm, 0.96 ± 0.26 mm, respectively for site I. It was found to be 1.33 ± 0.39mm, 0.96 ± 0.26 mm, respectively for site II (Table 1).

Intra group comparison (Table 1)

On intragroup comparison of PD from baseline to 24th week shows a significant reduction at both test site I and site II.

Intergroup comparison (Table 2)

Comparison of probing depth between the two groups from baseline to 24th week revealed a difference which was statistically not significant ($p>0.05$).

Clinical attachment level

The mean CAL at baseline, 24th week were 4.375 ± 0.91 mm, 1.58 ± 0.76 mm, respectively for site I. It was found to be 4.20 ± 0.94 mm, 1.5 ± 0.48 mm, respectively for site II (Table 1).

Intra group comparison (Table 1)

On intragroup comparison of CAL from baseline to 24th week shows a significant reduction at both test site I and site II.

Intergroup comparison (Table 2)

Comparison of Clinical attachment level between the two groups from baseline to 24th week revealed a difference which was statistically not significant ($p>0.05$).

Keratinized tissue width

The mean KTW at baseline, 24th week were 3.58 ± 0.60 mm, 4.29 ± 0.54 mm, respectively for site I. It was found to be 3.54 ± 0.62 mm, 4.42 ± 0.56 mm, respectively for site II (Table 1).

Intra group comparison (Table 1)

On intragroup comparison of KTW from baseline to 24th week shows a significant reduction at both test site I and site II.

Intergroup comparison (Table 2)

Comparison of Keratinized tissue width level between the two groups from baseline to 24th week revealed a difference which was statistically not significant ($p>0.05$).

VAS Score

The mean VAS score at baseline, 24th week were 5.33 ± 0.89 mm, 3.25 ± 0.96 mm, respectively for site I. It was found to be 2.96 ± 0.66 mm, 0.67 ± 0.685 mm, respectively for site II (Table 1).

Intra group comparison (Table 1)

On intragroup comparison of VAS score from baseline to 24th week shows a significant reduction at both test site I and site II.

Intergroup comparison (Table 2)

Comparison of VAS score between the two groups from baseline to 24th week revealed a difference which was statistically not significant ($p>0.05$).

DISCUSSION

This study was designed to compare the clinical efficacy of coronally advanced flap and modified semilunar coronally advanced flap in the treatment of Miller's class I and II gingival recession. Multiple approaches have been used to treat gingival recessions. The coronally advanced flap procedure is a very common approach for root coverage.⁶ This procedure is based on the coronal shift of the soft tissues on the exposed root surface. coronally advanced flap has gained an exceptional success in the treatment of gingival recession as the lining

mucosa is elastic and mucosal flap raised beyond the mucogingival junction can be stretched in the coronal direction to cover the exposed root surface.⁹

Though CAF is choice of treatment, it has disadvantage of vertical releasing incisions which might be cause of flaptrophism through the limitations of vascularization of its lateral parts. The blood supply reduction can be crucial. Some authors claim that the vertical incisions may proliferate the probability of formation of visible unesthetic white scars.⁷ To overcome these disadvantages, simplified surgical techniques such as semilunar coronally advanced flap was proposed, but stability for semilunar coronally positioned flap without sutures and non-involvement of papilla have been questioned.⁸ Therefore, to overcome these disadvantages modified semilunar coronally advanced flap was carried out in this study.

The intragroup analysis of RD in site I (CAF) at baseline was 2.96 ± 0.66 mm. This was found to reduce after 24th week with the mean of 0.67 ± 0.685 mm. Result of this study showed that, there was a statistically significant reduction in the RD in site I between baseline to 24th week. These result are consistent with the previous studies.^{9,10,11} This may be due to coverage of more coronal advancement offlap with no tension because of vertical releasing incisions. In respect to site II the mean of recession depth at baseline was 2.88 ± 0.68 mm which was reduced to 0.58 ± 0.42 mm at 24thweek. This result was in accordance with the study done by Jahangirnezhad *et al*¹² used an adhesive (Epiglu) to stabilize the semilunar coronally advanced flap showed a mean decrease from baseline to 24th week period Bitterncourt *et al*¹³ used sutures to stabilize the semilunar coronally advanced flap shown a mean decrease from baseline to 24thweek period. Reduction in the RD may be attributed to sutures placement for flap stabilization after coronal advancement.

In the intergroup comparison both site I and II showed similar amount of improvement in RD reduction which was statistically nonsignificant ($p=0.36$).

Statistically significant reduction in recession depth in both sites attributed to standard inclusion criteria and exclusion criteria, thick gingiva biotype, adequate width of keratinized gingiva, split thickness of flap, tension free flap placement at least 1 mm coronal to the CEJ, increased stability due to application sutures and patient maintenance.⁹ During the early healing phase, all care were taken to avoid any stress to the surgical site. Patients were not allowed to brush for the first four weeks following surgery, after which they were encouraged to brush with a roll method. Thus, considering the clinical evaluation both the techniques i.e. CAF and MSCAF has shown an improvement with an achievable root coverage.

The observation obtained in PD between the site I (CAF) and site II (MSCAF) has shown no statistical significant difference from baseline to 24thweek ($p=0.5$). In site I the mean value of PD at baseline was 1.42 ± 0.51 mm which was reduced to 0.96 ± 0.26 mm after 24thweek. This result of the present observation in the site I (CAF) was in accordance with study by Moka *et al*¹⁴ shown reduction in PD from baseline to 24thweek.

In Site II (MSCAF) the mean value of PD baseline was 1.33 ± 0.39 mm which was reduced to 0.96 ± 0.26 mm after 24thweek. The inclusion of PD as an analysis was conducted to evaluate

if there was a direct detrimental effect of the therapy on increasing probing depth.^{12,14} The observation could be attributed to the shrinkage of gingival tissue following scaling and root planing which was included in the procedure protocol.¹¹

An intergroup comparison showed no statistical significant difference ($p=0.37$) in CAL. However, when intragroup comparison was evaluated a statistical significant increase in CAL was obtained in site I from mean of 4.375 ± 0.91 mm at baseline 1.58 ± 0.76 mm at 24th week. This observation could be correlated with the previous studies.^{10,14} Reduction in CAL may be due to coronal advancement of flap. Site II also showed a statistical significant improvement from mean of 4.20 ± 0.94 mm at baseline to 1.5 ± 0.48 mm at 24th week. This observation was in accordance with the previous studies.^{12,13} The gain in attachment may be due to some form of new attachment to the root surface has been achieved.

Intragroup comparison was evaluated a statistical significant increase in KTW was obtained in site I from mean of 3.58 ± 0.60 mm at baseline to

4.29 ± 0.54 mm at 24th week respectively. This observation was in accordance with the previous studies.^{9,14,15} The gain in attachment may be due to periodontal ligament derived granulation tissue or tendency of gingival margin return to its previous position. Site II also showed a statistical significant improvement from mean of 3.54 ± 0.62 mm at baseline to 4.42 ± 0.56 mm at 24th week respectively. This observation was in accordance with the previous studies.^{12,13,15} The gain in attachment may be due to granulation tissue in the semilunar area change into same as tissue that was present prior to the repositioning of the soft tissue. An intergroup comparison showed no statistical significant difference ($p=0.29$) in mean KTW.

The increase in the width of keratinized tissue in both sites is due to the inclination of the coronally displaced mucogingival margin, to regain its original position, after the gingiva margin attains stability at the level of the cemento-enamel junction.

In site I, CRC was accomplished in five teeth (43.8%) with defects. These results were in accordance with the studies done by Baldi *et al.*,¹⁶ Pini Patro G *et al.*,¹⁷ Saletta D *et al.*¹⁸ CRC achieved in some teeth may be due to mucosal flap which is elastic in nature was raised above the mucogingival junction can be extended in a coronal direction to cover the defect. In site II CRC was achieved in four teeth (33.3%) whose defect was treated. This result of CRC was in accordance with the studies done by Franca-Grohmann *et al.*,¹⁹ Santamaria *et al.*²⁰ The complete root coverage in all cases was not achieved in sites treated with modified semilunar coronally advanced flap may be due to the incision which is perpendicular direction to the displacement of the gingiva which in turn cause contraction in apical direction. However, the complete root coverage achieved in some cases may be due reverse the contraction forces by sutures. The complete root coverage results are superior in CAF sites may be due to incisions parallel to the displacement of gingiva which may attributed to obtain more complete root coverage.²¹

Regarding DS in site I, it reduced from 5.33 ± 0.89 at baseline to 3.25 ± 0.96 at 24th week. In site II, it reduced from 2.96 ± 0.66 at baseline to 0.67 ± 0.685 at 24th week. An intergroup comparison showed no statistically significant difference

($p=0.11$) in mean DS. The reason for reduction of DS may be due to gain in recession depth.

CONCLUSION

Based on the results from this clinical study we can conclude that the CAF or MSCAF can be utilised successfully to treat gingival recessions. However, additional clinical studies with a longer monitoring period and larger number of patients with deeper gingival recession defects are needed for better assessment of this technique in the treatment of recession defects.

Acknowledgement

With deep respect, I want to thank Dr. Chakravarthy. Y.S.H.S, Professor, Department of Periodontology, for his encouragement, support and guidance. I want to thank Dr.G.Anusha, reader, Department of Periodontology, for her constant support.

Conflict of Interest- Nil

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How to cite this article:

Sumana N *et al* (2022) 'Comparison of Coronally Advanced Flap With A Modified Semilunar Coronally Advanced Flap In The Treatment of Gingival Recession', *International Journal of Current Advanced Research*, 11(03), pp. 537-542.
DOI: <http://dx.doi.org/10.24327/ijcar.2022.542.0119>
