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## Research Article

### CORONALLY ADVANCED FLAP PROCEDURE: CONVENTIONAL VS SEMILUNAR APPROACH FOR ROOT COVERAGE IN ISOLATED GINGIVAL RECESSION – A CLINICAL COMPARATIVE EVALUATION

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#### ABSTRACT

**Aim:** Various surgical procedures have been proposed as effective treatment methods for recession defects. The purpose of this study was to compare the clinical outcome of gingival recession therapy using coronally advanced flap (CAF) or semilunar coronally positioned flap (SCPF).

**Material and Method:** Procedures were performed in 18 patients having bilateral miller class I or class II buccal recession defects. Randomly assigned sites received either CAF or SCPF treatment. Clinical parameters measured at baseline, 3 months and 6 months after the procedure included recession depth, clinical attachment level and pocket depth.

**Results:** Recession depth decreases from  $2.27 \pm 0.80$  to  $0.33 \pm 0.75$  with coronally advanced flap (85.46% root coverage) and from  $2.16 \pm 0.68$  to  $0.57 \pm 0.75$  mm (73.61% root coverage with SCPF). The differences obtain after the treatment in recession depth (RD), clinical attachment level (CAL) and pocket depth (PD) between the two procedures were non-significant.

**Conclusion:** The finding from this study indicates that coronally advanced flap and semilunar coronally positioned flap can be successfully used to treat class I and class II gingival recession. There was no statistically significant difference regarding the treatment outcome of two procedures.

**Clinical Significance:** Both techniques can be used in clinical practice for treating gingival recession.

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## INTRODUCTION

Gingival recession is defined as the displacement of the soft tissue margin apical to cemento-enamel junction (Glossary of Periodontology Terms, 4th ed. Chicago American Academy of Periodontology; 2001). It is associated with major functional and esthetic problems and has been related clinically to higher incidence of root caries, attachment loss, hypersensitivity and smile related concerns (Griffin and Cheung, 2004). Soft tissue recession and attachment loss is a common finding in people with untreated plaque associated inflammatory periodontal disease. Among other factors associated with marginal tissue recession are alveolar bone dehiscences (Bernimoulin and

Curlovic, 1977, Lost, 1984), gingival quality and quantity (Novaes *et al*, 1975, Baker and Seymour, 1976, Maynard, 1987), high muscle attachment, frenal pull (Trott and Love, 1966), traumatic tooth brushing, tooth malposition and iatrogenic factors related to restorative and periodontal treatment procedure (Garman, 1967, Lindhe and Nyman, 1980).

Over the years various root coverage procedures have been employed to overcome these problems in Miller's class I and class II gingival recession. These procedures may be broadly classified as pedicle grafts, free soft tissue autograft and combination of both, with and without adjunctive regeneration

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or root biomodifications. In the selection of treatment procedures, factors such as depth and width of recession, availability of donor tissue presence of muscle attachment and esthetics have to be taken into consideration. Pedicle graft is procedure of choice when suitable gingival tissue is available in the neighbourhood of recession. Depending on the site of availability of suitable donor tissue, pedicle graft may either be coronally advanced or laterally placed. Among the most widely used is the coronally advanced flap alone (Allen and Miller, 1989, Harris and Harris, 1994, Bernimoulin et al, 1975) or its combination with subepithelial connective tissue graft (Bouchard et al, 1994, Paolantonio et al, 1997, Levine, 1991). Studies suggest that one of the most important factor to achieve success in any type of mucogingival surgical procedure is the preservation of an adequate blood supply (Berlucchi et al, 2002). Pedicle grafts have an edge over the free soft tissue graft, so far as the vascularity of graft and esthetics are concerned. Moreover the need of second surgical site is also eliminated in these procedures. Pedicle grafts are employed either as partial thickness or full thickness or a combination of both. Split thickness flap with connective tissue or periosteal retention is reported to be associated with less resorption of crestal bone.

The semilunar coronally positioned advanced flap is a coronally advanced flap in which there is no requirement of vertical releasing incision (Tarnow, 1986). The reported advantages owing to this modification includes tension free flap after coronally repositioning, no shortening of vestibule, neighbouring papilla bearing no adverse esthetic change. Moreover there is no need of sutures as the flap is tension free (Tarnow, 1986). Keeping in view these reported claims, an attempt has been made in the present study to clinically compare the effectiveness of this procedure with the coronally advanced flap technique in covering the root exposure owing to isolated gingival recession.

## METHOD AND MATERIALS

The study population was selected from the patients of Department of Periodontology. A total of 36 bilateral maxillary canine gingival recession sites (Miller class I and class II) were treated in 18 patients, age ranging from 20 to 45 years.

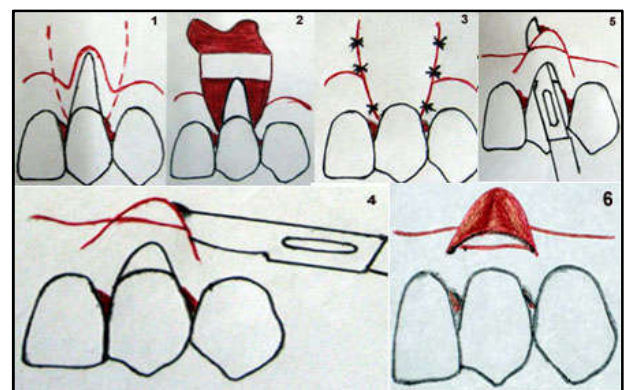
All patients received oral hygiene instructions before they were enrolled in the study. Teeth were scaled and polished. Informed consent was obtained in each case. On the day of surgery randomly one site was subjected to coronally advanced flap (group A) where as contralateral site in the same subject was treated with semilunar coronally positioned flap (group B). At each selected site, pocket depth (PD) was measured on midfacial surface of tooth with help of Williams Probe (HU Friedy Co.). Depth of recession was recorded with periodontal probe and rubber stopper. The dimensions were recorded with depth gauze of vernier caliper. CAL was calculated accordingly. Data were collected at baseline (the day of surgery), 3 months and 6 months post operatively. The study was approved by ethical committee.

### Surgical Procedure

Before elevation of the flap the exposed root surfaces were gently planed with gracey curettes. Coronally Advanced Flap

Procedure was initiated with the placement of two apically divergent vertical releasing incisions, extending from a point coronal to the cemento enamel junction at the mesial and distal line axis of the tooth and apically into the lining mucosa.

A split thickness flap was prepared by sharp dissection mesial and distal to the recession and connected with an intra crevicular incision. Apical to the receded soft tissue margin on the facial aspect of the tooth, a full thickness flap was elevated to maintain maximal thickness of the tissue flap to be used for root coverage. Approximately 3 mm apical to crest of alveolar bone a horizontal incision was made through the periosteum, followed by a blunt dissection into the vestibular lining mucosa to release muscle tension. The blunt dissection was extended buccally and laterally to such an extent that the mucosal graft can be easily positioned coronally at the level of cemento enamel junction. The tissue was coronally advanced, adjusted for optimal fit to the prepared recipient bed, and secured at the level of the cemento enamel junction by suturing the flap to the connective tissue bed in papilla region. Additional lateral sutures were placed to carefully close the wound at the releasing incision [Fig. 1, 2, 3]. Semilunar Coronally Positioned Flap was performed as per guidelines in originally described procedure (Tarnow, 1986) [Fig 4, 5, 6].



Figures- 1-6 1. Shows two vertically divergent releasing incisions 2. Split thickness flap prepared 3. Tissue flap coronally advanced 4. Shows semilunar incision placed apical to recession 5. Shows split thickness dissection 6. Flap coronally positioned to level of CEJ.

### Statistical Analysis

Comparison between and within the two groups at baseline, 3 months and 6 months were made by student's t-test. A probability (P) of 0.05 was considered as the significant value threshold.

## RESULTS

18 patients exhibiting pair of bilateral Miller class I or class II recession were investigated in this study, they were seen at 1 month, 3 months and 6 months for post-operative follow ups. At all post-operative appointments, the teeth involved in the surgery were deplaque and polished. During the initial 4 weeks, the patients were instructed not to brush on the involved teeth. Plaque control at included teeth was done with cotton tipped applicator. Healing was uneventful in all cases. Fig. 7 & 8 shows excellent results of CAF and Fig. 9 & 10 shows results of SCPF treatment. Table 1 to 3 illustrated the result of evaluations at baseline, 3 months and 6 months. Student's t-test did not show differences between the two groups at baseline for

any of the three parameters tested [Table 1 to 3]. Therefore the two groups could be considered homogeneous.



[Figures-7-10] 7. Pre-operative photograph (CAF) 8. Post-operative photograph (CAF) (at six months) 9. Pre-operative photograph (SCPF) 10. Post-operative photograph (SCPF) (at six months)

**Table 1** Intergroup comparison of recession depth at baseline, 3 months and 6 months

	Mean Values Group A (mm)	Mean Values Group B (mm)	t	P
Preoperative (Base Line)	2.27 ± 0.80	2.16 ± 0.68	0.44	NS
Postoperative (3 months)	0.30 ± 0.72	0.52 ± 0.70	0.90	NS
Postoperative (6 months)	0.33 ± 0.75	0.57 ± 0.75	0.95	NS

Groups are compared at 5% level of significance

**Table 2** Intergroup comparison of pocket probing depth at baseline, 3 months and 6 months

	Mean Values Group A (mm)	Mean Values Group B (mm)	t	P
Preoperative (Base Line)	1.38 ± 0.50	1.38 ± 0.50	0.00	NS
Postoperative (3 months)	1.11 ± 0.32	1.11 ± 0.32	0.00	NS
Postoperative (6 months)	1.11 ± 0.32	1.22 ± 0.42	0.00	NS

Groups are compared at 5% level of significance.

**Table 3** Intergroup comparison of clinical attachment level at baseline, 3 months and 6 months

	Mean Values Group A (mm)	Mean Values Group B (mm)	t	P
Preoperative (Base Line)	3.65 ± 1.25	3.55 ± 1.44	0.19	NS
Postoperative (3 months)	1.41 ± 1.04	1.63 ± 0.96	0.64	NS
Postoperative (6 months)	1.44 ± 0.90	1.79 ± 1.10	1.00	NS

Groups are compared at 5% level of significance.

Recession depth [Table 1] in coronally advanced flap group decreased from  $2.27 \pm 0.80$  mm to  $0.33 \pm 0.75$  mm corresponding to mean root coverage 85.46%. In semi coronally advanced positioned flap group recession depth [Table 1] decreased from  $2.16 \pm 0.68$  to  $0.57 \pm 0.75$  corresponding to a mean root coverage of 73.61%. Complete root coverage was achieved in coronally advanced flap group in 7 out of 9 sites of Miller class I recession defects corresponding 77.77% sites. In semilunar coronally positioned flap complete root coverage was achieved in 7 out of 11 sites of Miller's class I recession corresponding to 63.63% sites. The differences between the groups were not statistically significant at baseline, 3 months or at 6 months [Table 1]. No significant change were observed in two groups between baseline, 3 months and 6 months for PD. In CAF group CAL [Table 3] improved from  $1.44 \pm 0.90$  mm to  $3.65 \pm 1.25$  mm with mean gain in attachment of approximately 2 mm. In semi CAF [Table 3] CAL improved from  $1.79 \pm 1.10$  mm to  $3.55 \pm 1.44$  mm with mean gain in attachment of approximately 2 mm. The

differences between the two groups for clinical attachment level were statistically non-significant.

## DISCUSSION

In spite of advances and modifications in the surgical technique management of mucogingival problems still remains a challenge to the dentist in his day to day practice. Before performing mucogingival surgery, the practitioner should select the most predictable way to achieve successful root coverage.

The success of root coverage procedures, with either free graft or pedicle flaps, has been shown to be related to the degree of vascularization of the grafted tissue as blood provides nutrients, O<sub>2</sub> and growth factors, essential for the survival of the graft [Berlucchi. *et al.*, 2002, Langer and Langer, 1985]. Previous study [Pini Prato *et al.* 2000] demonstrated the negative influence of flap tension on blood supply and consequently on clinical results, when CAF is used to achieve root coverage in class I and II gingival recessions. Semilunar coronally positioned flap is claimed to preserve the blood supply in the absence of flap tension [Tarnow, 1986].

Results at 6 months showed mean root coverage of 85.46% for CAF group with mean gain in attachment level of 60.05% and for SCPF group mean root coverage 73.61% with mean gain in attachment level of 49.29%. The literature reports wide variations for this parameter. In fact for CAF alone the mean root coverage ranges from 60% [Trombelli, 1996] to 99% [Harris and Harris, 1994].

Allen and Miller, (1989) obtained 98% of root coverage in 28 patient with total of 37 sites utilizing CAF technique. Wennstrom and Zucchelli, (1996) treated 67 patients that compared CAF (45 sites) with subepithelial connective tissue graft (58 sites) and reported coverage of 98 percent and 97 percent respectively. High success rate in these studies may be attributed to inclusion of Miller's class I cases only.

In the present study Miller's class I and II defects were treated, neither flap thickness nor amount of keratinized tissue were a criteria for exclusion.

Caffesse and Guniard, (1978) found 64% root coverage with CAF where 64% root coverage was found by Bernimoulin *et al.* (1975) and Tenenbaum *et al.* (1980) found 57% mean root coverage. The result of these studies are found to be comparable with the present study in terms of percentage of root surface covered.

Huang *et al.* (2005) treated 24 patients that compared CAF with and without combination of platelet rich plasma (PRP) and found mean 83.5 percent root coverage in CAF group and 81 percent in CAF ± PRP group, while Pinni Prato *et al.* (2000) treated 10 patients with coronally advanced flap procedures. One site was polished and other was scaled and root planed and found  $89 \pm 14$  percent root coverage in polished sites and  $83 \pm 16$  percent with scale and root plane sites. The results of these studies are in accordance with that of present study.

Semilunar positioned flap was introduced by Tarnow in 1986. Only few studies have provided outcome assessment data with regard to predictability and percentage of root recession resolution using this technique (Haghighat, 2006, Hammarstrom *et al.* 1997).

There was 73.61 percent of root coverage in the present study with semilunar coronally positioned flap whereas 90.95 percent of root coverage was observed by Bittencourt et al. (2006). The superiority in results might be attributed to better surgical armamentarium used by the operators in case of study done by Bittencourt et al. (2006). Moreover, selection of cases might also be the influencing factor.

Several trials demonstrated successful root coverage and attachment gain when semilunar repositioned flap had been used to cover buccal gingival recession. 100 percent root coverage was achieved in 63.63% of class I sites in semilunar coronally positioned flap while in coronally advanced flap 100% root coverage was achieved in 71.77% of class I sites. Thus a significant reduction in recession and gain in attachment level was found in both the procedures compared to baseline values. In the present study slight increase in root coverage was found in CAF procedure than sites treated with semilunar coronally repositioned flap. But both procedures were found effective in root coverage suggesting their application in day-to-day clinical practice.

Perusal of the available literature reveals that there is no published report comparing CAF with semilunar coronally positioned flap. Thus the objective of this study was to compare the effectiveness of above said procedures in root coverage.

## CONCLUSION

The goal of periodontal plastic surgery is to establish esthetic as well as function. The goal of soft tissue grafting procedure is to obtain complete root coverage and restore normal gingival architecture. The present study was undertaken in an attempt to evaluate the effectiveness of two coronally advanced flap technique i.e. coronally advanced flap and semilunar coronally positioned flap.

Within the limits of the present study the following conclusions can be drawn.

1. Both the procedures were found to be effective in root coverage and gain in clinical attachment level in treating Miller's class I and class II recession defects, suggesting their application in day to day clinical practice.
2. Coronally advanced flap procedure resulted in slightly higher percentage of root coverage than semilunar coronally positioned flap procedure.

**Clinical Significance:** Both techniques can be used in clinical practice for treating gingival recession

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