

## Original Article

### Clinical evaluation of semilunar coronally repositioned flap versus coronally advanced flap in the treatment of Miller's Class I gingival recession defects in maxillary anteriors and premolars

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#### ABSTRACT

**Background:** The aim of this study was to evaluate clinically the treatment of gingival recession by semilunar coronally repositioned flap versus coronally advanced flap in maxillary anteriors and premolars. **Method:** Twenty bilateral sites with at least one bilateral Miller's Class I gingival recession defects were selected. A split mouth study was designed wherein Site A was treated with semilunar coronally repositioned flap and Site B was treated with coronally advanced flap. **Results:** Descriptive statistics were expressed as mean  $\pm$  standard deviation (SD) for each group. Intragroup and intergroup variations in the various clinical parameters over a period of 3 months, were analysed using Paired t test, Unpaired t test and Repeated measures ANOVA (test of significance with Bonferroni correction). In the above tests, p value less than or equal to 0.05 ( $p \leq 0.05$ ) was taken to be statistically significant. **Conclusion:** Coronally advanced flap showed comparatively better result than semilunar coronally repositioned flap for the treatment of Miller's Class I gingival recession.

**Key words:** Coronally repositioned flap, gingival recession.

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#### INTRODUCTION

Gingival recession is an apical shift of the gingival margin with exposure of the root surface.<sup>1</sup> Gingival recession may involve one or more tooth surfaces.<sup>2</sup> Many factors have been proposed to influence the development of marginal tissue recession, including plaque-induced inflammation, toothbrush trauma, tooth alignment, orthodontics and restorative procedures.

Traditionally, periodontal therapy was predominantly focused on establishing biologically and functionally stable periodontium. The presence of gingival recession exemplifies a situation in which a treatment modality is needed that addresses not only biologic and functional, but also aesthetic demands.<sup>3</sup>

Over the last few years dentistry has evolved in such a way that clinicians are not only required to treat disease and improve function but also to cope with the ever increasing aesthetic demands of the patients. Among the aesthetic procedures, root coverage by periodontal plastic surgery has attracted the most interest.<sup>4</sup>

The treatment of gingival recession includes surgical and non-surgical treatment modalities. Nonsurgical treatment modalities include composite resin, glass ionomer cement build ups, porcelain veneers and laminates. Surgical treatment modalities include semilunar coronally repositioned flap, coronally advanced flap, connective tissue graft, free gingival graft and guided tissue regeneration.

Coronally advanced flap (CAF) is one of the most widely used surgical techniques indicated for the treatment of Miller's class I and class II gingival recession defects. The term coronally advanced flap was coined by Pini Prato et al., in 1999. This procedure is based on the coronal shift of the soft tissues on the exposed root surface (Allen & Miller 1989, Pini Prato et al. 2000). This approach may be used alone or in combination with soft tissue grafts (Wennström & Zucchelli 1996), bone matrix (Pini Prato et al. 1992) and enamel matrix derivative (Rasperini et al.). CAF may lead to excellent aesthetic results, avoiding the need for a second surgical site, more over it is simple to perform.<sup>5</sup> Tarnow (1986) reported the semilunar coronally repositioned flap technique, which is a procedure indicated for the treatment of gingival recession in areas with minimal labial probing depth and adequate band of keratinized gingiva. It is described as a coronally advanced, tensionless and sutureless flap that does not involve the adjacent papillae, thus preserving the aesthetics. According to the author (Tarnow 1994), advantages of the procedure, are that it does not shorten the vestibule and results in a perfect color blend with adjacent tissues, with a simple, predictable and fast procedure. In adults, the prevalence of gingival recession range from 20% to 100%.<sup>6</sup> So far very few studies have been reported comparing the two simple techniques; coronally advanced flap and semilunar coronally repositioned flap.

Hence a study was conducted to compare the clinical outcomes of the semilunar coronally repositioned flap (SCRFF) and coronally advanced flap (CAF) procedure in the treatment of Miller's class I gingival recession defects in maxillary anteriors and premolars.

#### **METHODS:**

Subjects for this split mouth study were selected from the Out Patient Department, Department of Periodontology, having at least one bilateral Miller's Class I gingival recession defects and were randomly assigned to receive treatment with either semilunar coronally repositioned flap or coronally advanced flap techniques. Selected sites were randomly treated as follows:

**Site A-** 20 gingival recession sites were treated with semilunar coronally repositioned flap (SCRFF).

**Site B-** 20 gingival recession sites were treated with coronally advanced flap (CAF).

#### **Inclusion criteria-**

- 1] Subjects within the age group of 18-47 years, of either sex.
- 2] Presence of bilateral Miller's Class I gingival recession defects, in maxillary anteriors and premolars
- 3] Probing depth (PD) < 3mm, without bleeding on probing.
- 4] Width of keratinized tissue > 2mm.
- 5] Recession height of 2-3mm.

#### **Exclusion criteria-**

- 1] Miller's Class II, III or IV gingival recession defects, presence of periapical radiolucency, caries, non-carious cervical lesions or restorations in the areas to be treated.
- 2] Pregnant or lactating females or those on oral contraceptives.
- 3] Smokers and tobacco chewers (AHA guidelines).
- 4] Medically compromised and unco-operative subjects

#### **Assessment of clinical parameters-**

##### **(At baseline, 1 month and 3 months interval postoperatively)**

1. Probing depth (PD), the distance from the gingival margin to the apical end of the gingival sulcus, was measured with a UNC-15 probe.
2. Relative gingival recession height (R-GRH) was measured as the distance from a fixed reference point on a customized acrylic stent to gingival margin.
3. Relative clinical attachment level (R-CAL), PD+R-GRH.
4. Width of keratinized tissue (WKT) was measured as the distance between the gingival margin and the mucogingival junction.

#### **Diagnostic study casts and stent fabrication**

In order to avoid the variations in the assessment of clinical parameters that occurs if the probing site and the direction of the probe insertion differs from one measurement to another, acrylic stents were fabricated on diagnostic study casts. The stent covered the incisal/occlusal one-third of the selected site, on the buccal and palatal aspect. A groove (guide plane) was made on the stent in relation to each involved tooth to guide the periodontal probe while taking measurements (**Fig. 1a and 1b**). This technique provided a fixed reference point (FRP) and fixed angulation for measurements at each site.

#### **SURGICAL PROCEDURES:**

##### **Semilunar Coronally Repositioned Flap (SCRFF)**

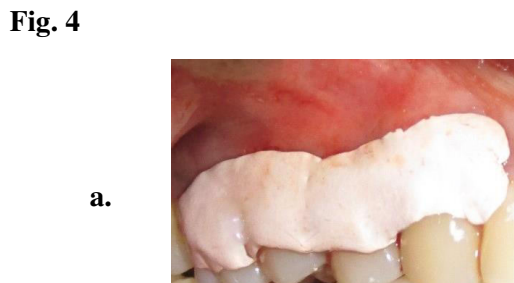
The surgical procedure was performed under local anesthesia (2% lignocaine hydrochloride containing adrenaline at a concentration of 1:80,000). Semilunar incision was placed following the curvature of the gingival margin, using a no.15 scalpel blade. This incision ended into the papilla on each inter-proximal area of the tooth to be treated, but not all the way to the tip of the papilla. At least 2mm of gingiva was preserved on each side of the flap in order to preserve the blood supply. The semilunar incision was curved apically to an extent to guarantee that the apical part of the flap rests on bone after the coronal advancement to cover the root (**Fig. 2a**). An intra-sulcular incision was placed mid-facially. A split-thickness dissection was performed from the initial incision coronally until connecting to the intra-sulcular incision. The mid-

facial tissue was completely released, coronally positioned to the cemento-enamel junction (CEJ) (**Fig. 3a**) and held in place against the tooth with a moist gauze pad placed with light pressure, perpendicular to the flap, for 5 min. No sutures were placed. Periodontal dressing was placed. (**Fig. 4a**)

**Coronally Advanced Flap (CAF)**

The surgical procedure was performed under local anesthesia. Sulcular incisions were placed on the buccal aspect of the teeth indicated. Two horizontal incisions were

placed at right angles to the adjacent interdental papilla at the level of CEJ. Two oblique vertical incisions were extended beyond the mucogingival junction, and a trapezoidal mucoperiosteal flap was raised up to the mucogingival junction. (**Fig. 2b & 3b**) A complementary horizontal incision was performed on the apical aspect of the flap, by means of a partial-thickness dissection. The flap was positioned at least 1mm coronal to the CEJ and maintained in place by means of individual 4.0 black braided silk sutures. (**Fig. 4b**) Periodontal dressing and sutures were removed 14 days after surgery



**Fig 1a and 1b:** Diagnostic stent placed

**Fig 2a** – Reflection of semilunar flap;

**2b-** Reflection of coronally advanced flap

**Fig 3a** – Coronal advancement of semilunar flap;

**3b -** Coronal advancement of trapezoidal mucoperiosteal flap

**Fig 4a** – Periodontal dressing placed;

**4b** – Sutures placed

**Post-operative care**

1. Appropriate antibiotic (Cap Amoxicillin 500mg t.i.d for 3days) and analgesic (Tab Ibuprofen s.o.s) was prescribed.
  2. Subjects were advised to rinse with 0.2% chlorhexidine gluconate solution twice daily for 14 days.
- The subjects were recalled at one month and 3 months post-operatively and clinical parameters were assessed.

**RESULTS**

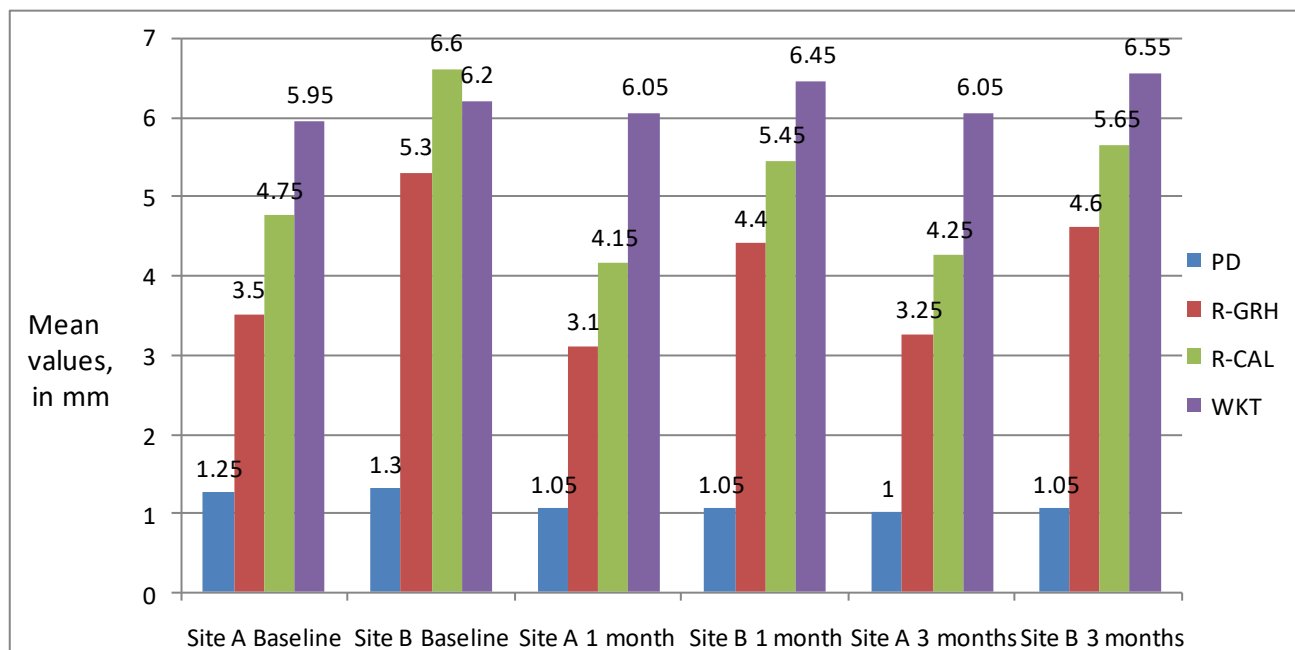
**Statistical analysis**

Descriptive statistics were expressed as mean ± standard deviation (SD) for each group. Intragroup and intergroup variations in the various clinical parameters over a period of 3 months, were analysed using Paired t test, Unpaired t test and Repeated measures ANOVA (test of significance with Bonferroni correction). In the above test, p value less than or equal to 0.05 (p≤0.05) was taken to be statistically significant. All analyses were performed using SPSS software version 17.

**Table No. I : Comparison of all clinical parameters at various time intervals at Site A and Site B**

	Probing Depth, in mm		Relative recession height, (in mm)		Relative clinical attachment level, (in mm)		Width of keratinized tissue, (in mm)	
	Site A	Site B	Site A	Site B	Site A	Site B	Site A	Site B
<b>Baseline (Mean ± SD)</b>	1.25 ± 0.44	1.30 ± 0.47	3.50 ± 0.61	5.30 ± 1.08	4.75 ± 0.85	6.60 ± 0.99	5.95 ± 0.60	6.20 ± 0.77
<b>1 month (Mean ± SD)</b>	1.05 ± 0.22	1.05 ± 0.22	3.10 ± 0.79	4.40 ± 1.14	4.15 ± 0.81	5.45 ± 1.15	6.05 ± 0.69	6.45 ± 1.05
<b>3 months (Mean ± SD)</b>	1.00 ± 0.00	1.05 ± 0.22	3.25 ± 0.64	4.60 ± 1.05	4.25 ± 0.64	5.65 ± 1.09	6.05 ± 0.69	6.55 ± 0.94
<b>P value (One-way ANOVA test)</b>	<b>0.019*</b>	<b>0.026*</b>	0.182	<b>0.029*</b>	<b>0.038*</b>	<b>0.003*</b>	0.859	0.475

**Graph No. I: Comparison of all clinical parameters at various time intervals at Site A and Site B**



[Table No: I, Graph No: I ] shows the mean probing depth, the mean RGRH, the mean RCAL, the mean WKT at base line and mean at one month and three months. [Table No: 1] shows, at baseline for Site A was  $3.50 \pm 0.61$  and for  $5.30 \pm 1.08$  Site B. The mean percentage of root coverage in Site A is  $6.25 \pm 15.50$  and Site B is  $13.38 \pm 9.89$  which shows that the Site B is superior to Site A in terms of root coverage. The mean WKT at baseline for Site A is  $5.95 \pm 0.60$ . At one month, it is  $6.05 \pm 0.69$  which did not show any changes in further three months.

## DISCUSSION

Esthetic appearance, due to gingival recession is a primary concern, for the individuals. However, this awareness is often limited to those patients with pronounced gingival display and their focus infrequently goes beyond the facial aspect of the anterior dentition. Patient-driven concerns about gingival recession are also raised if it interferes with comfort (e.g. root sensitivity) and/or function. In addition to esthetic concerns of the patient, an unfavorable consequence of gingival recession is the exposure of root surfaces to a potentially cariogenic supragingival microbiota. Common mucogingival conditions are recession, absence or reduction of keratinized tissue, and probing depths extending beyond the MGJ. Anatomical variations that may complicate the management of these conditions include tooth position, frenulum insertions and vestibular depth. While complete root coverage can be achieved in Class I and II defects, only partial coverage may be expected in Class III and Class IV recession defects. An ideal outcome of a root coverage procedure can be achieved only if the environment is plaque free (on tooth surface) and adequate periodontal support is present.<sup>2</sup> Another important clinical entity which is associated with the root coverage procedures is the amount of keratinized gingiva. Hence, the aim of every root coverage procedure is to achieve all these requisites besides restoring the gingival health.

The purpose of the study was to clinically evaluate root coverage with semilunar coronally repositioned flap and coronally advanced flap for treatment of Miller's class I gingival recession defects in the maxillary anteriors and premolars. The present data indicates that using these techniques result in appropriate root coverage. Decreases in both recession width and recession height, and increase in keratinized tissue width at the sites treated with both SCRF and CAF were reported at the end of this study. However, significantly superior results were observed with the CAF design than the ones obtained by the SCRF.

The initial height of the recession is an important factor that should be taken into consideration. Gingival recessions equal to or greater than 3 mm have worst prognosis of root coverage.<sup>6</sup>

In our study both the width and height of the recessions were measured, for the selection of technique for root coverage, among SCRF and CAF.

## Probing depth (PD)

Gingival margin was placed 2mm coronal to CEJ so as to counteract the gingival retraction following the surgery. This was in accordance with the previous studies conducted by Pini Prato and Baldi et al. The mean reduction in PD from baseline to 3 months post surgery at site-A ( $0.25 \pm 0.44$ ) and at site-B ( $0.25 \pm 0.44$ ) was statistically non significant. This is similar to the findings reported by Santos et al (2007) Though there was an overall reduction in probing depth on an intragroup comparison of both the sites, the reduction was non significant on intergroup comparison. This may be attributed to the variance in healing patterns of SCRF and CAF.

## Relative gingival recession height(R-GRH)

On comparison of the mean change in relative gingival recession height (R-GRH) from baseline to 3 months at site-A ( $0.25 \pm 0.55$ mm) and site-B ( $0.70 \pm 0.47$ mm), results were statistically significant at Site B (CAF). This result was in accordance with the study by Moka R L et al (2014)<sup>5</sup> and Nassar CA (2014).<sup>8</sup> The coronal advancement of flap by 2mm beyond the CEJ, followed by stabilization of the flap in the same position by interdental sutures, in CAF, significantly influences the reduction in recession height as compared to SCRF, that involves no sutures after coronal advancement of the flap.

## Relative clinical attachment level (R-CAL)

In our study the gain in relative clinical attachment level (R-CAL) was statistically significant at Site B (CAF) ( $0.95 \pm 0.60$ ) than Site A (SCRF) ( $0.50 \pm 0.69$ ). These results are similar to the findings reported by Ozenci et al (2015)<sup>9</sup> and Lucchesiet al (2007).<sup>7</sup>

## Width of Keratinized tissue (WKT)

This study confirms the gain of WKT in CAF group ( $0.35 \pm 0.59$ mm) than SCRF group ( $0.10 \pm 0.31$ mm). This was in agreement with the previous studies conducted by Moka R L et al (2014)<sup>5</sup> and Pini Prato et al (2005).<sup>10</sup> Whereas study conducted by Santana RB et al (2010), favoured SCRF in gaining an increase in width of keratinized tissue, after 6 months of post operative period. This may be attributed to the tendency of the mucogingival line, coronally displaced by means of surgery, to regain its original 'genetically determined' position. Ainamo et al (1992).<sup>11</sup>

Comparison of all clinical parameters of both the sites showed a statistically significant difference, with better outcomes for site-B (CAF) than site-A (SCRF) postoperatively. Tarnow, in 1986, introduced semilunar coronally repositioned flap with a modified apical incision and advocated a half-moon shape parallel to the contour of the recession. Miller's Class I gingival recessions have shown favourable results, in all the studies employing this technique till now. However, the stability of this semilunar coronally positioned flap without sutures and

noninvolvement of papillae have been questioned, and modifications of the technique have been suggested to have better control in pedicle repositioning and postoperative stability.<sup>12</sup> Coronally advanced flap being an apedicle flap provides a great combination of color, texture, contour, technical simplicity, little pain and postoperative discomfort (because scarring is by first intention), and good vascularization of tissue moved through the pedicle.<sup>13</sup> However individuals with shallow vestibule and thin gingival biotype are not indicated.<sup>14</sup>

In the present study, an overall comparison of each parameter of both the sites, at the end of 3 months, showed that there were better results obtained with the procedure of CAF (Site B). Significant difference being seen for parameters of R-GRH, R-CAL and WKT. The results of the present study were promising in terms of the clinical parameters. Adequate amount of root coverage was achieved at both the sites

### CONCLUSION

Thus from the present split-mouth study it can be concluded that the treatment of Miller's Class I gingival recession with SCRF or CAF, results in comparable clinical outcomes.

Further longitudinal observations may be necessary to evaluate the stability of these results and establish the long-term success of these surgical approaches.

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