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Comparative Evaluation of Coronally Advanced Flap with Modified Coronally Advanced Flap in the Management of Gingival Recession: A Randomized Clinical Trial

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Abstract

Gingival recession is one of the most common esthetic concerns associated with periodontal tissues. As the conventional technique of coronally advanced flap ends up with different disadvantages, a modified technique has been introduced to overcome the limitations. Thus, the two techniques has been planned to compare and evaluate. The study was conducted on 11 randomly selected subjects. In phase I, scaling was done and in phase II, coronally advanced flap technique in control group and modified coronally advanced flap technique in test group was done. Clinical attachment level, probing pocket depth, keratinized tissue width, length and width of recession, pain and healing index was assessed. Results showed a **s**tatistically significant reduction in pain index scores, clinical attachment level scores, probing depth scores, recession length and width scores in both the groups were observed. Also, statistically significant increase in healing index scores and keratinized tissue width scores were observed on intragroup comparison. However, on intergroup comparison, test group revealed better results as compared to control group in all the parameters. Thus, from the observation, it was concluded that both the groups has better clinical outcomes but test group showed better results in all the clinical parameters as compared to control group.

Keywords: Coronally advanced flap, Modified coronally advanced flap, Clinical attachment level, Probing pocket depth, Keratinized tissue width, Gingival recession, Esthetic concern.

Introduction

Gingival recession can be defined as displacement of marginal tissue apical to the cementoenamel junction (CEJ)[1]. It can be caused by periodontal disease, accumulations, inflammation, improper flossing, aggressive tooth brushing, incorrect occlusal relationships, and dominant roots[2] A wide range of surgical techniques have been proposed for the treatment of the gingival recessions. CAF procedure was introduced by Norberg in 1926[3]. Advantages of this technique are optimum root coverage, good colour blending of the treated area with respect to adjacent soft tissue and complete recovery of original soft tissue. Modified coronally advanced flap (MCAF) was introduced by Zucchelli and de Sanctis in

2000 to treat multiple recession defect[3]. This modification was based on an envelope flap which aims to avoid vertical releasing incisions. This will preserve the vascular system and reduce scars caused by the vertical incisions. Hence, the current study has been planned to compare and evaluate the recession coverage with coronally advanced flap technique and with modified coronally advanced flap technique.

Materials and method

A minimum number of 11 patients were selected for the study from the outpatient Department of Periodontics, Kothiwal Dental College and Research Centre, Moradabad. The Institutional Ethical Clearance was obtained before the initiation of the study. Inclusion Criteria included patients' age in between 25-65 years, Miller's Class I and II multiple recession defects in split mouth, a minimum 2 mm width of keratinized mucosa apical to recession and those who had given the written informed consent.

Patients with non-identifiable CEJ at recession sites, pregnant and lactating women and subjects with any systemic diseases or conditions not favourable for any periodontal surgery was excluded from the study.

Recession sites were selected, satisfying the eligibility criteria. Selected sites were consecutively divided into two groups, A and B by chit method.

Group A (Control group) – sites where coronally advanced flap technique was done. Group B (Test group) – sites where modified coronally advanced flap technique was done.

In the phase I (nonsurgical phase) scaling and root planing, oral hygiene instructions and occlusal adjustments, were done wherever required. Following the phase I therapy re-evaluation was done. Clinical attachment level (CAL), probing pocket depth (PPD), keratinized tissue width (KTW), length and width of recession (RL, RW) was measured at baseline. Phase II therapy (surgical phase) included surgical procedures which was done using coronally advanced flap technique in control group and modified coronally advanced flap technique in test group.

Local anaesthesia was administered and periodontal surgery was performed. Bard Parker blades no. 11, 12 and 15 were used to make intrasulcular, oblique, horizontal and vertical incisions where indicated as per the distribution of sites in the two groups. The specified surgical techniques were adopted in the two groups. Flap was reflected using periosteal elevator. On subsequent elevation of flap, debridement was performed with curettes and root surface was examined, if required scaling and root planing was done. Surgical flap was sutured with silk sutures and periodontal dressing (coe pak) was then placed over the surgical site. Removal of suture, coe pak was done after a week and patient was asked to avoid mechanical oral hygiene maintainance for 1 week at surgical site. Oral hygiene instructions and aids were given.

Statistical Methods

The statistical software SPSS 19.0 is used for analysis of data. The descriptive statistics like mean and S.D. of data were calculated. The significance difference of parameters between two groups (inter group comparison) was tested by t test and within group (intra group comparison) was done by ANOVA Test The 95% C.I. and 5% level of significance was used for analysis of data.

Results

Pre and post treatment assessment of the recession sites was based on clinical parameters that is pain index at 1st, 3rd and 7th day post operatively, healing index at 7th and 15th day post operatively. CAL,

PPD, KTW, RL and RW at baseline, 3rd and 6th month post operatively.

Out of 11 patients, equal % of male and female with an average age of 40 years were selected. Upon comparison, baseline scores of both the groups were non significant. Post operative pain score was reduced in both the groups, with more reduction of pain in group B (Table1).Upon comparison of healing index score, significantly better healing was observed in Group B as compared to Group A on 7th day. But on 15th day, no significant difference in healing score was observed.(Table 2).On comparing CAL, between both groups at 3rd month, no significant difference was observed. 6th month results revealed significant difference between both the groups with better results in Group B(Table 3). On comparing PPD between both groups at 3rd month, non significant result was observed and there was no change in probing pocket depth in both Group A and Group B. At 6th month, the difference between both groups were non significant, but reduction of probing pocket depth was more in Group B as compared to Group A (Table 4). Upon comparison of KTW between both groups at 3rd month, non significant result was observed but numerically more gain was observed in Group B. At 6th month the difference in mean value was non significant between both groups but numerically more gain of keratinized tissue width was observed in Group A (Table 5). Upon comparison of recession length and width both groups at 3rd and 6th month, significant result and more coverage was observed in Group B as compared to Group A (Table 6).

Table 1: Comparison of pain index between Group A and B

Period	Group	N	Mean ± S.D.	Difference (A-B)		P value
				Mean	S.E.M.	
1st day	A	11	4.27±1.104	1.909	0.415	0.001***
	B	11	2.36±0.674			
3rd day	A	11	1.73±0.467	1.364	0.244	0.000***
	B	11	0.36±0.505			
7th day	A	11	0.00±0.000	0.000	0.000	0.000***
	B	11	0.000±0.000			

*Significant p <0.05, not significant p>0.05

Table 2: Comparison of healing index between Group A and B

Period	Group	N	Mean ± S.D.	Difference (A-B)		P value
				Mean	S.E.M.	
7th day	A	11	2.91±0.701	-0.818	0.226	0.005**
	B	11	3.73±0.467			
15th day	A	11	4.45±0.522	-0.455	0.207	0.053
	B	11	4.91±0.302			

*Significant p <0.05, not significant p>0.05

Table 3: Comparison of CAL at baseline, 3rd and 6th month between Group A and B

Time	Group	N	Mean ± S.D.	Difference (A-B)		P value
				Mean	S.E.M.	
Baseline	A	11	4.36±1.027	-0.182	0.122	0.167
	B	11	4.55±1.036			
3rd month	A	11	2.00±0.632	-0.091	0.211	0.676
	B	11	1.91±0.701			
6th month	A	11	2.45±1.036	0.909	0.315	0.000*
	B	11	1.55±0.522			

*Significant p <0.05, not significant p>0.05

Table 4: Comparison of PPD at baseline, 3rd and 6th month between Group A and B

Time	Group	N	Mean ± S.D.	Difference (CAF – MCAF)		P value
				Mean	S.E.M.	
Baseline	A	11	1.55±0.522	0.182	0.226	0.441
	B	11	1.36±0.505			
3rd month	A	11	1.18±0.405	0.000	0.191	1.000
	B	11	1.18±0.405			
6th month	A	11	1.18±0.405	0.182	0.122	0.167
	B	11	1.00±0.000			

*Significant p <0.05, not significant p>0.05

Table 5: Comparison of KTW at baseline, 3rd and 6th month between Group A and B

Time	Group	N	Mean ± S.D.	Difference (A-B)		P value
				Mean	S.E.M.	
Baseline	A	11	3.55±0.934	-0.545	0.247	0.052
	B	11	4.09±0.944			
3rd month	A	11	4.91±0.831	-0.364	0.244	0.167
	B	11	5.27±0.786			
6th month	A	11	5.27±0.786	0.182	0.400	0.659
	B	11	5.09±0.944			

*Significant p <0.05, not significant p>0.05

Table 6: Comparison of RL and RW at baseline, 3rd and 6th month between Group A and B

	Period	Group	N	Mean ± S.D.	Difference (A-B)		P value
					Mean	S.E.M.	
Recession length	Baseline	A	11	2.82±0.751	0.000	0.191	1.00
		B	11	2.82±1.168			
	3rd month	A	11	1.27±0.786	0.727	0.273	0.024*
		B	11	0.55±0.522			
	6th month	A	11	1.27±0.786	0.727	0.273	0.024*
		B	11	0.55±0.522			
Recession width	Baseline	A	11	1.45±0.820	0.091	0.091	0.341
		B	11	1.36±0.924			
	3rd month	A	11	0.82±0.405	0.273	0.237	0.277
		B	11	0.55±0.522			
	6th month	A	11	0.82±0.405	0.273	0.237	0.277
		B	11	0.55±0.522			

*Significant p <0.05, not significant p>0.05

Figures:

CAF

Figure 1: Measurement of recession length

Figure 2: Incision line of CAF

Figure 3: Post operative picture after suture and co - pak removal

Figure 4: 6 months post operative

MCAF

Figure 5: Measurement of recession length

Figure 6: Incision line of MCAF

Figure 7: Post operative picture after suture and co - pak removal

Figure 8: 6 months post operative

Discussion

CAF procedure is one of the most predictable techniques and considered as gold standard[4]. Although CAF is a simple and esthetic procedure but the disadvantage of this procedure is that it requires two vertical releasing incision. Vertical releasing incisions causes white scar which will lead to unaesthetic appearance. Also, this will damage the blood supply of the flap resulting in delayed healing[6]. To combat such limitations, a modification of coronally advanced flap technique was introduced which do not require vertical incisions. Zucchelli and de Sanctis in 2000 have introduced the modification of CAF to treat multiple recession defect[3]. This modification was based on an envelope flap which aims to

avoid vertical releasing incisions. On intergroup comparison, reduction of pain score was observed in both the groups with less pain in the Group B as compared to Group A. It is likely, in Group B, because of absence of two vertical incision less pain was experienced by the patient as compared to Group A. Similar to the findings of present study, greater pain score was observed in CAF group in a study by Potey AM et al., in 2019[7]. This study compared CAF with and without platelet-rich fibrin in the treatment of multiple adjacent recession defects. Another study by Kaur A et al., in 2021 revealed lower VAS score at 3rd and 7th day in microsurgery group as compared to macrosurgery group[8]. Since in our study macrosurgical procedure was followed, more pain index score was observed in both the groups.

On intragroup comparison of healing score in Group A and B revealed better results on 15th day when compared to 7th day. Whereas, intergroup comparison revealed better healing on 7th day in Group B, but no significant difference in healing was observed on 15th day. Most probably, in Group B, because of absence of two vertical incision, there is no scar formation which lead to better blood supply and better healing score in Group B as compared to Group A. Similar results were observed in a study by Huang LH et al., in 2005[9], which revealed statistically significant wound healing index score at 2 weeks follow up with CAF procedure. But, another study by Govindasamy BR et al., in 2021[10] revealed that no significant difference in wound healing at 12th week when CAF was compared with semilunar coronally repositioned flap in the management of maxillary gingival recessions.

CAL comparison revealed better result in Group B as compared to group A at 3rd and 6th month. This overall reduction from baseline could probably represent a combination of the formation of new connective tissue attachment as well as epithelial attachment and the results are seen in accordance with the study by Bherwani C et al., in 2014[11] which revealed statistically significant clinical attachment level gain with Zucchelli's technique.

Intergroup comparison of probing pocket depth at 3 month revealed, non significant result and no change in probing depth scores in both the groups. Similarly, at 6 month, difference in mean value was non significant but reduction of probing pocket depth was greater in Group B as compared to Group A. Reduction of probing depth from baseline could probably represent a combination of the formation of new connective tissue attachment as well as epithelial attachment. Also, maintenance of oral hygiene by the patient lead to stable result from 3 to 6 months. The results seen in this study are similar in accordance with a study by Irfan M et al., conducted in 2017[12] which compared CAF with and without dehydrated amnion allograft in the treatment of gingival recession. The authors observed decrease in pocket depth with CAF in both the test and control group.

Similarly, another study by Khobragade S et al., in 2016[13] compared MCAF with and without orthodontic button application in management of multiple proximate gingival recession defects. Results revealed that in control group decrease in probing depth was observed from baseline to 2 months and no change was observed from 2 to 4 months.

On intergroup comparison of KTW, at 3rd and 6th month, non significant result was observed but numerically better results were observed in Group B. This significant increase in KTW could have been because of a combination of the formation of new connective tissue attachment as well as epithelial attachment[14]. In a case series by Zucchelli G et al., in 2000, multiple recession type defects and results revealed significant increase in the KTW after 1 year[15]. This is in agreement with the findings of our study. Another study by Weinberg et al., conducted in 2021[16] revealed similar results when CAF was

compared with connective tissue graft for treating orthodontic associated Miller class III gingival recession.

On intergroup comparison of recession length and width, at 3rd month and 6th month, revealed better coverage in Group B as compared to Group A. Most probably, because of proper oral hygiene maintenance and tooth brushing technique, there was significant decrease in recession length and width was observed in both the groups. Similar studies by Lafzi A et al., conducted in 2016[17] and Irfan M et al., conducted in 2017[12] revealed significant reduction in the recession length and width after 3 and 6 months post surgery by CAF. Another study by Dixit N et al., conducted in 2016[18] compared MCAF with and without platelet-rich fibrin. Results revealed significant decrease in recession length and width in both the groups, but after 1 month relapse of length and width of recession was observed.

Summary

Thus, from the above observation it can be concluded that both techniques provide a simple and predictable treatment of Miller's class I and II gingival recession. However, modified coronally advanced flap technique provided better results in all the clinical parameters. A possible explanation for the difference in results is the use of vertical releasing incisions which forms scar and reduces vascularity to the flap. This results in reduced healing as compared to the modified technique which do not use vertical releasing incision.

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