

Original Article**Modified Coronally Positioned Flap for Isolated Gingival Recession, Evaluated with Root Coverage Esthetic Score System**

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Article Received: 20th August, 2021; Accepted: 20th December, 2021; Published: 31st December, 2021DOI: <https://doi.org/10.3126/jonmc.v10i2.41771>**Abstract****Background**

Various modifications of the coronally displaced flap have been proposed in the literature with the attempt of treating gingival recession. This study is undertaken to evaluate the predictability of the modified coronally positioned flap in isolated gingival recession not only in terms of root coverage but also with the esthetic outcome.

Methods

Fifteen isolated gingival recessions with at least 1mm of keratinized tissue apical to the defect were treated with a modified coronally advanced flap. All recessions fall into Miller class I. The clinical re-evaluation was performed 3 months and 1 year after the surgery. Statistical analysis was performed using statistical application software (SPSS16.0). Multivariate ANOVA was used for analysis.


Results

At the 1-year examination, the average root coverage was 94.6% of the pre-operative recession depth. There was a mean clinical attachment gain of 3.3 ± 0.1 mm at 1 year follow-up. The average increase of keratinized tissue between the baseline and the 1-year follow-up amounted to 1.53 ± 0.13 mm. Root coverage esthetic score (RES) was recorded at the end of follow-up period. 13/15 cases showed RES score of 9 and 2/15 cases showed RES score of 6.

Conclusion

The modified coronally advanced surgical technique is effective in the treatment of isolated gingival recession in the upper jaw.

Key words: *Esthetic, Gingival recession, Root coverage*

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Introduction

Periodontics for long has been concerned with commonly occurring problems of gingival recession and root exposure. In addition to the esthetic concern of a patient, exposed root surfaces are frequently associated with the hypersensitivity and plaque retention.

Advanced flaps are probably the most simple, yet successful procedure for managing gingival recession. De Sanctis and Zucchelli G (2007) [1] proposed split-full-split coronally positioned flap for the treatment of isolated gingival recession. Zucchelli G and De Sanctis (2009) [2] proposed the above mentioned modification for the multiple gingival recessions with high rate of success.

With most of these techniques, only percentage of root coverage was assessed with less importance given to the esthetic outcome of these techniques (color blending, marginal tissue contour, soft tissue texture). To overcome this important objective of plastic periodontal procedure, a new method of assessing the esthetic outcome of these procedures, called Root coverage Esthetic score (2008) has been proposed [3].

The present study was undertaken to evaluate the predictability of the modified coronally positioned flap in isolated gingival recession not only in terms of root coverage but also with the esthetic outcome, which includes, soft tissue texture, marginal tissue contour, and color blending.

Subjects and Methods

The subjects for the present prospective follow up study were selected from the outpatient department of Periodontology, Nobel Medical College Teaching Hospital, Biratnagar, Nepal. The patients treated in the study were enrolled in the period from April 2018 to April 2021. The study was performed in accordance with the Helsinki declaration 1975, as revised in 2000. The study protocol was reviewed and approved by the Institutional Ethics Committee, Nobel Medical College Teaching Hospital, Biratnagar, Nepal. (Ref. no. 576/2021)

Fifteen patients with isolated gingival recession sites of maxillary teeth, equal or more than 2 mm were selected. These subjects belonged to either sex and were between 20 to 40 years of age. Each patient signed informed consent. The relevant personal history, including oral hygiene measures, smoking history, past dental history, and medical history were recorded.

Patient with Maxillary anterior and premolar teeth with isolated gingival recession equal to or more than 2 mm, Miller's class I gingival recession with

minimum of 1mm of keratinized tissue and Normal alignment of teeth in the arch were included in the study. Similarly, patient with root caries and root surface restoration, smoking and positive medical history where periodontal surgery is contraindicated were excluded from the study.

Clinical measurements were taken on the day of surgery and again at 3 month and 1year follow up.

Surgical procedure (Fig a to Fig d)

The area to be operated was anaesthetized.

The design of the flap consisted of the following incisions [1]

- ❖ Two horizontal beveled incisions, mesial and distal to the recession defect located at a distance from the tip of papillae equal to the depth of the recession plus 1 mm.
- ❖ Two beveled oblique slightly divergent incisions at the end of the horizontal incisions extending into the alveolar mucosa.

The resulting trapezoidal-shaped flap was elevated with a split–full–split thickness approach in the coronal–apical direction (Fig b). The root surface was mechanically treated with the curette. Exposed root surfaces belonging to the area of anatomic bone dehiscence were not instrumented so as not to damage connective tissue fibers still inserted into the root cementum.

The facial soft tissue of the anatomic interdental papillae coronal to the horizontal incisions was deepithelized to create a connective tissue bed.

Following this the flap was moved coronally and positioned 1 mm coronal to the CEJ covering the tip of the deepithelized papillae and sutured.

Suturing of the flap was started with two interrupted periosteal sutures performed at the apical extension of the vertical releasing incisions then it proceeded coronally with other interrupted sutures. This was done to facilitate coronal displacement of the flap and to reduce the tension on the last coronal sling suture. (Fig c)

Post-surgical instructions

Patients were instructed to brush the teeth avoiding the treated area and to rinse with 10 ml chlorhexidine gluconate solution (0.2%) twice daily for 1min. Analgesics (Ibuprofen 400 mg three times daily) were prescribed for three days. Patients were recalled after 10 days for removal of periodontal dressing and sutures.

Follow up visits

All patients were recalled for oral prophylaxis every month for first 3 months and then at 6 months and 1 year. All the clinical parameters



were recorded at 3 month and 1 year follow-up. At the end of 1 year, esthetic outcome of modified coronally positioned flap was evaluated using Root coverage esthetic score system (RES). Statistical analysis was performed using statistical application software (SPSS16.0). Multivariate ANOVA was used for analysis.

Plaque index PII (Sillness and Loe, 1964)

The PII score for the area was obtained by totaling the four plaque scores per surface of the tooth.

Root coverage esthetic score (RES)[3]

This included gingival marginal level (GM), Marginal tissue contour (MTC), Soft tissue texture (STT), Mucogingival junction (MGJ) and gingival color (GC)

1. Gingival margin level (GM)
 - Score 0 – failure of root coverage
 - Score 3 – partial root coverage
 - Score 6 – complete root coverage
2. Marginal tissue contour (MTC)
 - Score 0- irregular gingival margin (did not follow the CEJ)
 - Score 1- proper marginal contour / scalloped gingival margin (follows the CEJ)
3. Soft tissue contour (STT)
 - Score 0 – presence of scar formation/ keloid like appearance
 - Score 1 – absence of scar or keloid formation
4. Mucogingival junction (MGJ)
 - Score 0 – MGJ not aligned with the MGJ on adjacent teeth
 - Score 1 – MGJ aligned on adjacent teeth
5. Gingival contour (GC)
 - Score 0- color of tissue varies from gingival color of adjacent teeth
 - Score 1- normal color and integration with the adjacent soft tissue.

The scoring of RES was done by an individual other than the operator, who was masked to treatment group. Fifty patients treated with different root coverage procedures were used to calibrate the examiner. The examiner evaluated all patients on two separate occasions 48 hours apart. Calibration was accepted if all the recordings could be reproduced with the same scoring by the examiner.

The score 0 was assigned in cases when final gingival margin position was equal or apical to the previous recession depth (failure of root coverage procedure), irrespective to color, presence of scar, gingival margin or level of muco-

gingival junction (in relation to adjacent teeth). Score 0 was also assigned when a partial or total loss of interproximal papilla (black triangle) occurred following treatment.

Results

The fifteen areas of recession treated showed the following distribution. 3 right maxillary canines, 1 left side maxillary canine, 9 right maxillary first premolars, 2 left maxillary first premolars.

Gingival Recession height

The mean preoperative gingival recession height was found to be 2.73 ± 0.29 mm. The mean post-operative reduction of gingival recession height after 3 month and 1 year was found to be 2.46 ± 0.10 mm. Mean percentage root coverage of 94.67% was observed at 1 year evaluation. Reduction in recession height was statistically significant (p value = 0.00). (Table 1)

It was also noted that in 13/ 15 cases complete root coverage (100%) was obtained at 3 months and 1 year.

Probing pocket depth/sulcus depth

The mean preoperative probing pocket depth was 1.0 ± 0.0 mm. The mean probing pocket depth at 3 month and 1 year remained the same as that of the preoperative probing pocket depth and it was not statistically significant.

Clinical attachment level

The mean preoperative clinical attachment level was 3.73 ± 0.28 mm. The mean clinical attachment level at 3 month was 0.40 ± 0.27 mm, which remained same at 1 year follow-up. There was a mean clinical attachment gain of 3.3 ± 0.1 mm which remained stable (p value = 0.00) (Table 1)

Width of Keratinized gingiva

The mean preoperative width of keratinized gingiva was found to be 2.60 ± 0.13 mm. The mean post-operative keratinized gingiva at 3 month was 4.13 ± 0.26 mm. and remained same at 1 year (Table 1)

There was a mean increase in the width of keratinized gingiva about 1.53 ± 0.13 mm which was statistically significant (Table 1)

Table 1: Clinical parameters (Mean \pm SD in mm)

	Baseline	3 months	1 year	Baseline-3 months	Baseline-1 year
Gingival recession height	2.73 ± 0.28	0.27 ± 0.18	0.27 ± 0.18	2.46 ± 0.10	2.46 ± 0.10
Clinical attachment level	3.73 ± 0.28	0.40 ± 0.27	0.40 ± 0.27	3.33 ± 0.10	3.33 ± 0.10
Width of keratinized gingiva	2.60 ± 0.13	4.13 ± 0.22	4.13 ± 0.22	1.53 ± 0.13	1.53 ± 0.13



Root Coverage Esthetic Score (RES score) (Table 2)

Root coverage esthetic score was given considering the five variables.

13/ 15 cases gingival marginal level was above the CEJ, suggesting complete root coverage (score 6) and in 2/15 cases there was partial root coverage (score 3). In all fifteen cases marginal tissue contour was regular inclusive of partial root coverage cases the margin of the gingiva was scalloped. Thus for all the fifteen cases, regarding marginal tissue contour score 1 was given. Since the same flap was coronally displaced, soft tissue texture was same as with the adjacent gingiva and well blended, which was scored as 1. The mucogingival junction of the coronally positioned flap site appeared more coronal to the MGJ in relation to the adjacent areas. Thus, according to the scoring criteria, score 0 was given for all the cases. Since the flap was coronally positioned the color of the gingiva remained same without any changes. Thus for all the cases regarding color score 1 was given. The total RES score for 13/ 15 cases were 9 and for 2/15 cases where there was partial root coverage score 6 was given. (Table 2)

Table 2: Root Coverage Esthetic Score (RES Score)

Case No	Tooth No	Root coverage esthetic scores- individual criteria					Root coverage esthetic score – total
		Gingival marginal level	Margin al tissue contour	Soft tissue texture	Mucogingi v-al junction	Gingiv al color	
1	14	6	1	1	0	1	9
2	24	6	1	1	0	1	9
3	14	6	1	1	0	1	9
4	14	6	1	1	0	1	9
5	14	6	1	1	0	1	9
6	23	6	1	1	0	1	9
7	13	3	1	1	0	1	6
8	13	3	1	1	0	1	6
9	14	6	1	1	0	1	9
10	14	6	1	1	0	1	9
11	14	6	1	1	0	1	9
12	14	6	1	1	0	1	9
13	13	6	1	1	0	1	9
14	24	6	1	1	0	1	9
15	14	6	1	1	0	1	9

Plaque index

The mean plaque score measured just before surgery showed a mean plaque score of 0.60 ± 0.13 . The mean plaque scores, recorded after 3 months and 1 year, were 0.47 ± 0.13 and 0.53 ± 0.13 respectively (Table 3). It was statistically non significant (Table 3)

Table 3: Comparison Of Plaque Scores- At Different Time Intervals

TIME INTERVAL/days	MEAN +S.D (in mm)
Pre-operative	0.60 ± 0.13
3 months	0.47 ± 0.13
1 year	0.53 ± 0.13
Mean change (preoperative-3 months)	0.13 ± 0.00
p- value	0.317 (N.S)
Mean change (preoperative- 1 year)	0.06 ± 0.00
p- value	0.655(N.S)

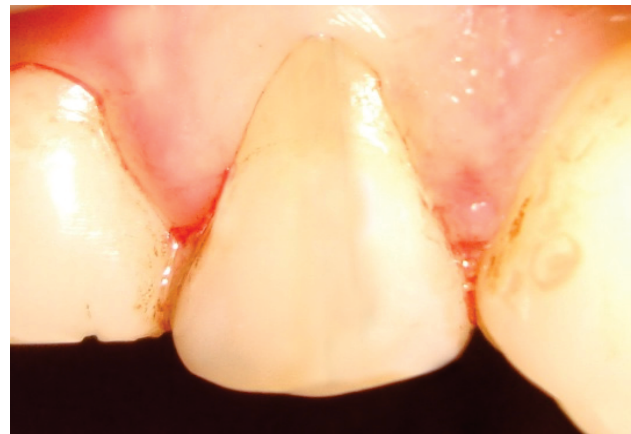


Figure (a)- Pre-operative

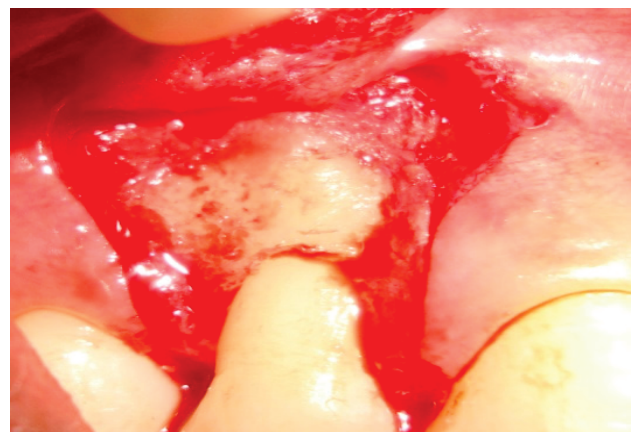
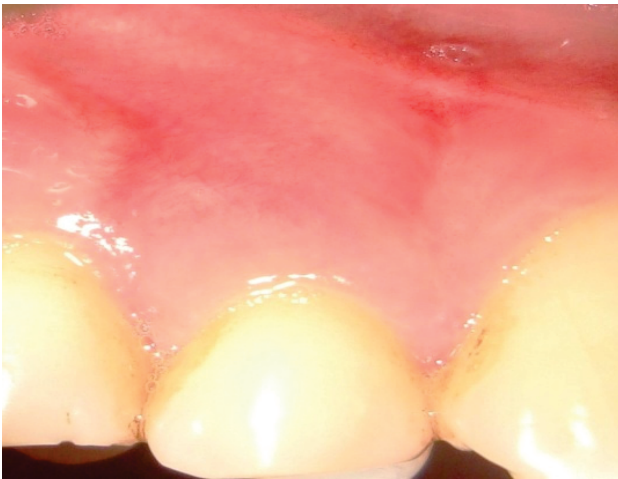


Figure (b)- Split full thickness flap



Figure (c)- Sutures placed





Figure(d)- 1 year post-operative

Discussion

Root coverage procedures are commonly done when gingival recession has esthetic implications and other related problems associated with the root exposure like dentinal hypersensitivity. The following observations were made when the results of the present study were analyzed and compared to the previous studies. In the present study, 13 / 15 cases showed complete root coverage and 2 / 15 cases achieved partial root coverage, thus mean root coverage was 94.67%. Incidentally, the results of the present study are in tandem with the clinical findings observed by Allen and Miller (1989) [4] where they reported 98% of mean root coverage and 84% complete root coverage. These results were also comparable to the studies by De Sanctis M and Zucchelli G (2007)¹ in which they have followed the similar method of coronally positioned flap as followed in the present study, where they reported mean root coverage of 96.7 %.

The better results obtained in the present study may be attributed to the split – full – split flap design. Split thickness elevation at the level of the surgical papilla guarantees support and good blood supply in the interproximal areas mesial and distal to the root exposure. The full thickness portion by including the periosteum confers more thickness and thus better opportunity to achieve root coverage to that portion of the flap residing over the previously exposed avascular root surface. Vertical incisions were given in this technique to displace the flap coronally. In Ideal plastic periodontal surgical procedures for root coverage, vertical incisions should be avoided to have better blood supply and to avoid the scar-like appearance in the area of vertical incision post surgically. However in the present study no scar like appearance was noted in the surgical area

where vertical incisions were given. Since the surgical papillae outlined by the horizontal 3 mm incision and by the vertical beveled incisions were very wide and thus provided a longer area for anchoring the flap to the underlying vascular bed and more tissue to place the coronal sling suture. Furthermore partial thickness of surgical papillae facilitated the nutritional exchange between the flap and the underlying deepithelialized anatomical papillae which improved the blending of surgically treated area with respect to adjacent soft tissue.

In the present study, 2/15 cases, only partial root coverage was obtained. In both the cases the pre-operative gingival recession was more, that was 5mm and clinical attachment loss was 6 mm. Since the pre-operative recession was more, amount of keratinized gingiva was relatively less and distance of the flap to be advanced coronally being more than the other cases [5]. The possible other reasoning, for partial coverage could be, relatively more prominent root (both were canine) and thin tissue biotype [6]. When the marginal gingiva is thin pre-surgically stabilization of gingival margin is not achieved, which allows the apical shift in the position of the gingiva and partial exposure of the root surface. In the present study there was a significant gain in the clinical attachment level. The results obtained in the present study are in accordance with the studies done by De Sanctis M and Zucchelli G(2007) [1], Allen and Miller [4]. However to verify the type of attachment that is formed, it would require histological evaluation, which was beyond the scope of the study.

Historically the presence of an “adequate” zone of keratinized gingiva has been considered critical for the maintenance of gingival health. Pini Prato (2005) [7] has stated that an increase in the width of keratinized gingiva is a desirable effect in minimizing the possibility of recurrence of the gingival recessions. In the present study there was significant increase in the width of keratinized gingiva (1.53+ 0.13mm). The results of the present study are comparable with the reports of Harris (2000) [8] and De Sanctis M and Zucchelli G(2007) [1]. There are mainly two hypotheses that have been put forward to explain the increase in the width of keratinized gingiva following plastic periodontal surgical procedures. The tendency of the mucogingival line coronally displaced by means of surgery, to regain its original “genetically determined” position (Ainamo et al 1992) [9] or the capability of connective tissue deriving from the periodontal ligament to participate in the healing process taking place at the

Dento-gingival interface (Karring et al 1971, Lundberg and Wennstorm 1988 and Pasquinelli 1995) [10,11,12]. Among these two, hypotheses given by Ainamo et al [9] appears to be more applicable to the increase in the width of keratinized gingiva following coronally advanced flap (PiniPrato1996) [13]. Root coverage esthetic score system is a new evaluation system to assess the success of the root coverage procedures. There were several drawbacks of the certain procedures like free gingival graft, connective tissue graft and combined techniques in terms of color blending, change in contour and improper position of mucogingival junction relation to the adjacent teeth, This led to the development of new index system, which considers all the above factors. In the present study even though the color blending and soft tissue texture were expected to be good, since the same tissue was coronally placed, change in the contour, alteration in the position of mucogingival junction and amount of root coverage may vary. In all the cases in the present study the mucogingival junction was not aligned properly in relation to the adjacent teeth. Since the possibility of change in the position of the mucogingival junction was expected to occur, long term evaluation may be needed, to know whether mucogingival junction would regain its original "genetically determined position". Subjects in the present study were followed up for only 1 year post operatively, since change in the position of the gingival margin and mucogingival junction may occur over a period of time, longer follow up period is required.

Conclusion

The result of the present study demonstrated that the modified coronally advanced surgical technique is effective in the treatment of isolated gingival recession in the upper jaw with acceptable esthetics to patient and increase of keratinized tissue.

Conflicts of interests: None

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