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Research Article

CLINICAL EVALUATION OF EFFICACY OF MODIFIED MUCOGINGIVAL FLAP TECHNIQUE WITH CONNECTIVE TISSUE GRAFT IN MANAGEMENT OF MULTIPLE ADJACENT CLASS III GINGIVAL RECESSIONS

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ABSTRACT

Root coverage in mandibular anteriors is often exigent when associated with mucogingival conditions such as shallow vestibule and frenum insertions. A modified mucogingival flap (MMGF) technique along with the use of a connective tissue graft (CTG) was attempted to manage multiple adjacent class III recessions in 15 patients. The Recession height reduced momentarily from baseline to 3 and 6 months with significant gain in attachment, Root coverage % and Vestibular depth throughout the study period ($p < 0.05$). At 6 months, the treatment resulted in 67.10 ± 22.90 % of RC indicating MMGF as a predictable procedure.

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INTRODUCTION

Gingival recession is a composite phenomenon often associated with other mucogingival conditions complicating therapeutic outcome (Dym H, Tagliareni JM). Root hypersensitivity, the progression of gingival recession, difficulty in plaque maintenance around non-keratinized alveolar mucosa and predisposition to root caries has broadened the scope of mucogingival therapy.

The anterior mandible is an intricate area for clinicians especially when multiple gingival recessions are present. The associations of frenal pull, shallow vestibule, narrow interdental spaces, thin gingival biotype and inadequate attached gingiva may negatively influence the outcome of conventional root coverage procedures (Friedman N, Levine). Classifications of gingival recession given by Miller in 1983 and systematic review by Wennstorm in 1996 indicate the difficulty of obtaining favorable outcomes in patients with class III / IV recession defects. Verma and Romanos performed bridge flap in patients with advanced recession along with problems of shallow vestibule, inadequate width of AG, frenal pull and obtained root coverage RC % that varied from 25-

87.5%. This clinical study proposes a modified mucogingival flap technique MMGF for the treatment of multiple adjacent Miller's Class III recession defects in mandibular anterior region which is adapted from Marggraf's coronally repositioned flap (CRF) and an additional vestibuloplasty incision, which is a modification of Edlan & Mejcher technique aiming to deepen the vestibule. The outcome of any mucogingival surgical technique is enhanced by the placement of soft tissue grafts. The subepithelial connective tissue graft SCTG is considered as the gold standard autogenous graft and has proven its efficacy in the management of class I & II recession defects. Chambrone *et al.*, reported in a systematic review that complete root coverage was obtained in adjacent Miller's Class I and II recession defects following combined use of coronally advanced flap with connective tissue graft CTG. Scientific literature is sparse regarding the surgical management of multiple adjacent mandibular class III recession defects. The current case series employs the MMGF with CTG in the management of multiple adjacent class III mandibular recession defects.

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Case Presentation

Sample recruitment

15 Systemically healthy subjects presenting with multiple mandibular anterior class III recession defects with probing depth < 3mm, free of tooth mobility, caries/cervical abrasion/restorations, exhibiting good oral hygiene compliance were recruited from outpatient clinic, Department of Periodontics, SRM Dental College. All participants were informed about the nature of the therapeutic intervention, duly signed consent forms were obtained.

Presurgical protocol & clinical measurements

Clinical parameters such as probing pocket depth (PPD), recession height (RH), clinical attachment level (CAL), width of attached gingiva (AG), width of keratinized tissue (KT), relative vestibular depth (RVD) were recorded using customized stents with UNC 15 periodontal probe. RH measured as the distance from cemento-enamel junction to gingival margin at the mid buccal position of each site with the help of a customized acrylic stent. PPD measured as the distance from gingival margin to base of the gingival sulcus at the mid buccal position. CAL measured as the distance from the cement-enamel junction to base of the gingival sulcus at the mid buccal position. KT measured as the distance from the gingival margin to the mucogingival junction (evaluated using a chemical method –Lugol's Iodine). AG measured by subtracting the probing depth from width of keratinized tissue. RVD measured as the distance from base of stent to the deepest position of the vestibule. RC% is calculated according to the following formula:

Root coverage = (preoperative vertical recession height - postoperative vertical recession height)/preoperative vertical recession height) x 100

All recruited patients underwent a meticulous phase I therapy was performed.

Surgical procedure

The MMGF comprised of a full thickness mucoperiosteal flap raised using #15C blade along the marginal gingiva of involved teeth extending bilaterally to one tooth on either side and apically relieving muscle attachments. Root surface debridement was done, palatal connective tissue graft was obtained using single incision technique was trimmed and adapted onto the recipient bed with finger pressure. Flap margins were approximated using absorbable vicryl sutures. The donor site was approximated so as to heal with primary intention. A relieving incision was made superficially 7mm apical to the gingival margin releasing tension in the flap and periodontal dressing was placed. Antibiotics and analgesics were prescribed for five days. Chlorhexidine mouth wash 0.12% was recommended for 6 weeks as an adjunct. The periodontal dressing, sutures were removed at the end of two weeks. (Fig 1A - H)

Laser assisted incision

At 4 week recall, a vestibular incision was made from 33 to 43 using diode LASER (3W power in continuous mode). This procedure aided in prevention of muscle reattachments in healing tissue during the remodelling period of the graft. The clinical parameters were re-assessed at 3 and 6 month follow-ups. Subject level statistical analysis was carried out using SPSS version 22.0 software with significance level fixed at 5%.



Fig 1 (MMGF with CTG)

(A):Pre-Operative Clinical Picture, (B): Standardization Of Measurements At Baseline Using Acrylic Stent, (C): Flap Reflection, (D): CTG Placement, (E): Suturing And Placement Of Relieving Incision, (F): Laser Assisted Vestibular Incision Given At 4th Week, (G): 3 Months Postoperative Review, (H): 6 Months Postoperative Review

RESULTS

Healing was uneventful and none of the subjects reported any post-operative complications. In all the participants, RH reduced from baseline to three and 6 months. Statistically significant differences were observed from baseline to three and six months in all clinical parameters ($p < 0.05$). The decrease in RH was statistically significantly from baseline to 3 and 6 months (i.e. percentage mean RC of 61%, 67% respectively), Gain in clinical attachment was noted at all time intervals similar to RH. There was a statistically significant gain in AG, KT and RVD from baseline to 3 and 6 months. (Table 1, 2).

Table 1 Descriptive parameters in study group at various time intervals

(N= 15)	Baseline	3 Months	6 Months
PI	0.97 ± .21	0.50 ± .15	0.67 ± .25
GI	1.12 ± .26	0.56 ± .11	0.52 ± .29
RH	2.66 ± .46	1.07 ± .64	0.90 ± .65
PPD	1.35 ± .40	1.35 ± .40	1.35 ± .40
CAL	4.01 ± .76	2.42 ± .86	2.25 ± .86
AG	2.44 ± .70	4.25 ± .90	4.18 ± .89
KT	3.80 ± .51	5.59 ± .82	5.54 ± .76
RVD	9.12 ± .40	10.36 ± .46	10.39 ± .47

Values are presented as mean±standard deviation.

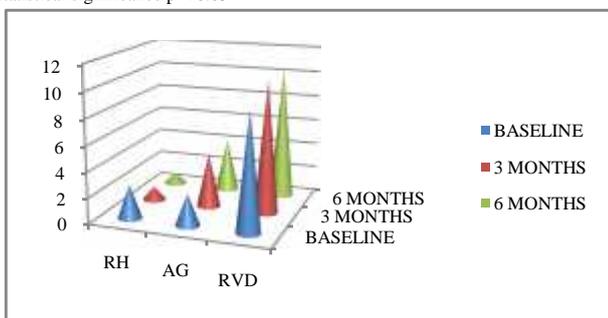
PI: plaque index, GI: gingival index, RH: recession height, PPD: probing pocket depth, CAL: clinical attachment level, AG: attached gingiva, KT: width of keratinized tissue, RVD: relative vestibular depth

Table 2 Mean differences and statistical significance of the descriptive clinical parameters in the subjects across various time intervals

(N=15)	Baseline Vs 3mon		Baseline Vs 6mon		3mon Vs 6mon	
	Mean Difference	p value	Mean Difference	p value	Mean Difference	p value
PI	0.47 ± .14	<0.001*	0.30 ± .36	0.006*	-0.16 ± .31	0.062
GI	0.55 ± .23	<0.001*	0.60 ± .42	<0.001*	0.04 ± .27	0.522
RH	1.59 ± .48	<0.001*	1.76 ± .59	<0.001*	0.17 ± .24	0.018*
PPD	NA	NA	NA	NA	NA	NA
CAL	1.59 ± .63	<0.001*	1.76 ± .59	<0.001*	0.17 ± .24	0.018*
AG	-1.79 ± .80	<0.001*	-1.74 ± .57	<0.001*	0.05 ± .39	0.598
KT	-1.79 ± .77	<0.001*	-1.74 ± .57	<0.001*	0.05 ± .37	0.596
RVD	-1.24 ± .51	<0.001*	-1.27 ± .52	<0.001*	-0.03 ± .16	0.489
RC%	3 months		6 months		p value	
	61.02 ± 20.77		67.10 ± 22.90		0.017*	

Values are presented as mean±standard deviation.

PI: plaque index, GI: gingival index, RH: recession height, PPD: probing pocket depth, CAL: clinical attachment level, AG: attached gingiva, KT: width of keratinized tissue, RVD: relative vestibular depth, RC: root coverage, * denotes statistical significance $p < 0.05$



Graph 1 Progressively significant changes in clinical parameters across the study period

RH: recession height, AG: attached gingiva, RVD: relative vestibular depth

DISCUSSION

Mucogingival therapy is not only intended to achieve root coverage but also to establish a healthy and stable

mucogingival complex (Miller 1992). The incidence of class III and class IV recessions in mandibular anteriors is frequently higher and may be symptomatic necessitating management (Kleber BM, Schenk HJ). Techniques employed in the past for the management of advanced recession defects include the free autogenous soft tissue grafts and flap designs based on coronally advanced flap, supraperiosteal envelope technique, tunnel technique and their modifications (Allen AL, Stimmelmayer, Zuchelli).

Cairo *et al* 2008 and Chambrone *et al* have highlighted the advantage of sub epithelial connective tissue grafting in mucogingival surgeries in their systematic reviews. Adequate blood supply from the tissues adjacent to the graft bed, level of interproximal gingival tissue and the characteristics of the incision are important for the survival of the grafted tissue over the avascular root surface. The lack of good adaptation between graft and the recipient site, and the loss of interdental bone that is characteristic of class III recessions may affect the therapeutic outcome.

This prospective case series proposed a modified mucogingival flap technique (MMGF), wherein, the vestibular incision neither exposed the deeper tissues nor compromised the vascularity elucidating the uncomplicated rapid healing. Deepening the vestibule by giving a releasing incision minimizes the tension in the advanced flaps (Wennström). The advantage of laser assisted incision given during the early healing period resulted in tension free remodeling of tissues and had auxiliary clinical benefits of minimal intraoperative bleeding and reduced patient discomfort (Azzi). In a study by Yilmaz Eftal comparing the outcomes using additional external vestibular releasing incision made with diode laser/ scalpel along with laterally positioned flap, the authors reported reduced patient discomfort in the laser incision group.

The mean percentage of root coverage obtained in this series was 61% at 3 months in and 67% at 6 months in both the groups respectively, indicating that the present technique is a feasible option. The reason for increase in root coverage from 3 to 6 months could be attributed to phenomenon of creeping attachment. Creeping attachment is a postoperative migration of the gingival marginal tissue in a coronal direction, covering partially or totally a previously denuded root (Goldman). Jacques Matter in 1980 observed the creeping attachment of free gingival graft for a five year follow up. Creeping of the tissue can be seen commonly in narrow recession defects with an average amount of 1mm, the mechanism of creeping attachment could be attributed to the presence of aseptic inflammation which favours an increase in the vascularization and proliferation of viable cells (Shapiro).

Yaman *et al* achieved a mean root coverage of 78% (modified coronally advanced tunnel technique with connective tissue graft) in multiple class III recession defects. This could be comparable with the 67% of mean root coverage we achieved. Aroca *et al* used a modified tunnel/connective tissue graft (CTG) technique with enamel matrix derivative in the treatment of multiple class III recession defects, where they achieved a difference in RH of 2.6 mm(83% root coverage) as to difference in RH of 1.76mm in this study. Superior results in the above mentioned studies could be accounted to the fact that they had included maxillary defects. Esteibar *et al* in a

retrospective study of 121 recession defects treated with three different protocols suggested that using connective tissue graft, root coverage of 74% could be predicted in class III recessions. Vestibular depth as a parameter has been evaluated in only few case reports. In this case series, at the end of 6 months, a submissive gain in mean vestibular depth of 1.27 mm was noted in all subjects. Further in another case series by Nicole *et al*, the authors obtained an increase in VD of 0.9 ± 0.5 mm. The benefits of Nicole's technique and ours were that, the vestibular deepening could be consummated along with the gingival augmentation.

Further in this case series, the mean gain in KT was 1.74 ± 0.57 mm at the end of 6 months. This was in line with the results obtained by Cardarapoli in the management of isolated class I and II recessions where they evaluated the efficacy of CAF with CTG and obtained a mean gain of 1.3 mm of KT in CTG group. The gain in KT observed was also comparable to the study results achieved by Paulo *et al* where the authors used Modified coronally advanced tunnel with CTG in the management of multiple class I/II recession defects and obtained a KT increase of 1.31 ± 1.23 mm.

CONCLUSION

Although this was a case series with limited number of patients, the results obtained were satisfactory on account of predictability in the management of advanced recession defects. The modified mucogingival flap technique with connective tissue graft is an efficient modality in the management of advanced multiple recession in the anterior mandible. Further trials are warranted to affirm the benefits of this procedure.

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