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Management of Miller's Class III gingival recession by pouch and tunnel technique and connective tissue graft obtained using single incision technique

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Abstract

Background: Receded gingiva leads to various problems such as dentinal hypersensitivity, root caries and unaesthetic appearance. Connective tissue grafting techniques have provided the best results till date when used in combination with root coverage procedures. The present paper highlights the use of pouch and tunnel (PT) technique in combination with connective tissue graft (CTG) that was procured using minimally invasive single incision technique for gingival recession coverage (RC).

Materials and Method: A total number of 12 patients and 24 defect sites with Miller's class III recession were treated using PT technique and CTG that was procured from maxillary palatal aspect by single incision technique. Probing pocket depth (PPD), clinical attachment level (CAL), thickness of attached gingiva (TAG), width of keratinized gingiva (WKG), height of gingival recession (HGR) and width of gingival recession (WGR) were the clinical parameters measured at baseline, 3 months and 6 months post-operatively.

Result: During the 3 months and 6 months follow-up, all the measured clinical parameters showed statistically significant improvement except PPD. The mean percentage of root coverage achieved at 3 months and 6 months was 88.07% and 86.09% respectively.

Conclusion: PT in combination with CTG achieves predictable RC even in Miller's class III recession cases.

Keywords: Connective tissue graft, pouch and tunnel, gingival recession, recession coverage

Introduction

The recession of the gingiva due to various reasons steers dentinal hypersensitivity of varying degrees and hastens root caries formation. Moreover, the long tooth appearance following the gingival recession is also highly unesthetic. For the above-mentioned reasons, recession coverage (RC) is crucial. However, the long-term stability of these procedures is greatly dependent upon the class of the gingival recession (GR). Miller's class I and II recession cases are inclined to have a higher percentage of recession coverage (PRC) whereas the PRC in Miller's class III and IV recession cases are less predictable [1].

Ever since its introduction by Edel in 1974, connective tissue graft (CTG) remains the gold standard treatment for soft tissue augmentation procedures in the field of dentistry [2, 3]. The justification for this is the dual-source of plasmatic diffusion and blood supply to the graft from the underlying periodontal plexus as well as the overlying flap [4]. Tatakis in 2015 in his consensus report from the AAP regeneration workshop, has suggested that CTG procedures for Miller's class III GR cases bestow substantial benefit in terms of PRC than any other RC techniques [1].

RC treatment of Miller's class III defects is demanding due to interdental soft tissue as well as bone loss. Furthermore, the treatment outcome is hindered by the presence of periodontal pockets, reduced vasculature, and prominent root surfaces [5]. However, according to Moussa EW in 2017, RC by pouch and tunnel (PT) technique in combination with CTG can offer stable results in terms of PRC and improve the final esthetics [6].

But the main drawbacks of CTG procedures are donor site morbidity and patient discomfort. In order to overcome these drawbacks, Ribeiro in 2008 developed a minimally invasive single incision technique to harvest the CTG [7].

Therefore, this present study aims to evaluate whether the PT technique in combination with CTG procured through single incision approach will enhance the treatment outcome of Miller’s class III recession cases.

Case series

Twelve systemically healthy patients (8 females and 4 males) with a chief complaint of hypersensitivity or long tooth appearance of mandibular anterior teeth were included in the study. Institutional ethical committee approval was secured before the commencement of the study. Written informed consents were obtained from all the patients who agreed to participate in the study after they were given a detailed explanation regarding the procedure. The age of the patients ranged between 20 and 50 years.

The criteria for inclusion of the patients are as follows: 1. systemically healthy individuals without any debilitating diseases that could hamper the treatment results 2. Miller’s class III GR defects with HGR ≥ 3 mm in the mandibular anterior region (Figure 1). The exclusion criteria for the study were: 1. patients with oral abusive habits such as smoking, tobacco chewing 2. pregnant and lactating women.

Following non-surgical periodontal therapy and oral hygiene instructions that included modified Stillman brushing technique, the clinical parameters such as probing pocket depth (PPD), clinical attachment level (CAL), the width of keratinized gingiva (WKG), the thickness of attached gingiva (TAG), the height of the gingival recession (HGR) and the width of the gingival recession (WGR) were measured at baseline using a UNC 15 periodontal probe. TAG alone was measured using an endodontic file and the values were recorded with a digital Vernier caliper. To avoid the inter-operator bias, all the surgical procedures were performed by the same operator (PR). The patients were scheduled for surgical therapy after exhibiting a satisfactory level of oral hygiene status.

The esthetic upshots achieved were assessed by the blinded examiner (MV) utilizing the root coverage esthetic score (RES) as proposed by Cairo *et al.* in 2009 [8]. The RES compared three photographs of the defect sites captured at the baseline, 3 months, and 6 months post-operative visits.

Case management

Under an aseptic environment, the surgical procedures were commenced after achieving local anesthesia of both the recipient and the donor site using 2% lignocaine HCl with 1:200000 adrenaline, by infiltration and greater palatine nerve block respectively. The recipient site was prepared to create the pouch and tunnel using disposable ophthalmologic tunnel knives. Initially, the tunnel knife was inserted intrasulcularly and a split thickness flap was elevated. Along the interdental papillary region, the base of the papilla alone was detached with the help of a tunnelling knife leaving the tip of the papilla intact (Figure 2).

CTG was harvested from the maxillary palatal aspect using single-incision technique. A single incision was given using BP blade no. 15, extending from the distal aspect of the first pre-molar to the distal aspect of the first molar. The blade was then inserted close to the epithelium, thereby separating the overlying epithelium from the underlying connective tissue (Figure 3). Releasing incisions were given at the proximal sides as well as the base of the graft to facilitate its removal. The connective tissue was then separated from the periosteum

using a periosteal elevator and the CTG was procured (Figure 4). The donor site was sutured using 4-0 silk suture material. CTG was split into two halves leaving one end of the graft intact. It was then expanded to double its initial length and then gently inserted into the recipient site (Figure 5) and secured using 6-0 polyglactin 910 suture material to the mesial and distal papillae of the defect sites.

Patients were counselled to apply ice-pack at the recipient site to minimize postoperative hematoma formation. Other instructions included the use of analgesics (Ibuprofen 400 mg BD for 3 days), antibiotics (Amoxicillin 500 mg TID for 5 days), and chlorhexidine gluconate 0.2% mouthwash twice a day for 2 weeks. They were also advised to avoid tooth-brushing of the recipient site for a week. The patients were scheduled for suture removal after 10 days. All the clinical parameters were re-assessed and recorded at 3 months and 6 months follow-up visits.

SPSS software version 20 was used to statistically analyze the clinical parameters. The values were considered statistically significant when the p-value was <0.001. The baseline, 3 months, and 6 months values were evaluated by employing repeated measures ANOVA with post-hoc Bonferroni test.

Clinical outcomes

At the time of suture removal, all the patients showed uneventful healing in both the donor as well the recipient sites. The patients reported minimal to no post-operative discomfort. Furthermore, none of the patients reported pain or swelling in the operated sites.

The results of the statistical analysis revealed that there was a statistically significant improvement in all the clinical parameters except PPD, from baseline to 3 months and 6 months (Figure 6) (Table 1). The HGR reduced from 3.02 ± 0.91 mm to 0.36 ± 0.80 mm at 3 months and 0.42 ± 0.88 mm at 6 months, with p-value <0.001. Similarly, WGR also lowered from 3.28 ± 1.03 mm to 0.87 ± 1.29 mm at 3 months and 0.85 ± 1.43 mm at 6 months, with p-value <0.001. The PRC attained at 3 months was 88.07% and at 6 months there was a slight decrease in PRC with a value of 86.09%. RES showed a high aesthetic outcome of score 9.1 ± 1.0.

Table 1: Assessment of the clinical parameters from baseline to post-operative 3 months and 6 months follow-up

	Values		P-value	Post-hoc test
	Mean	SD		
PPD base	2.04	.35	<0.022	B>3,6
PPD 3	1.82	.31		
PPD 6	1.82	.31		
CAL base	4.23	.78	<0.001	B>3,6
CAL 3	2.50	.60		
CAL 6	2.52	.66		
TAG base	1.52	.38	<0.001	6,3>B
TAG 3	2.53	.39		
TAG 6	2.88	.42		
WKG base	5.22	1.86	<0.001	3,6>B
WKG 3	6.78	1.72		
WKG 6	6.72	1.74		
HGR base	3.02	.91	<0.001	B>3,6
HGR 3	.36	.80		
HGR 6	.42	.88		
WGR base	3.28	1.03	<0.001	B>3,6
WGR 3	.87	1.29		
WGR 6	.85	1.43		

Repeated measures ANOVA with post-hoc Bonferroni test



Fig 1: Pre-operative image of Miller's class III gingival recession in relation to mandibular incisors



Fig 6: Recession coverage achieved at 6 months post-operative follow-up visit



Fig 2: Tunnel preparation done in relation to mandibular incisors. Note that the interdental papillary tip remains intact



Fig 3: Connective tissue graft (CTG) procured from maxillary palatal region using single incision technique



Fig 4: Measuring the harvested CTG in order to evaluate the extent that can be covered using the procured graft



Fig 5: CTG placed within the prepared pouch and tunnel in relation to mandibular incisors

Discussion

Miller's class III GR presents with recession extending to/beyond the mucogingival junction (MGJ) with loss of interdental soft tissue and bone [9]. RC in such cases can be expected only up to the level of inter-dental soft tissue on either side of the recession. This level can be determined by drawing an imaginary line connecting the tissue level on the mid-facial aspect of the defect teeth, using a periodontal probe [10]. Therefore, 100% RC in Miller's class III recession is not achievable. Moreover, the greatest challenge faced in such cases is post-operative stability of the attained RC for a longer period.

Brucelee W in 2020 suggested that management of Miller's class III recession cases can be successfully treated using CTG procedures where PRC achieved was 80% [11]. Tavelli *et al.* in 2018 in a systematic review and meta-analysis on the efficacy of PT technique for the treatment of GR implied that PT procedures were very effective for treating recession defects, showing mean PRC of 82.8% and 87.9% for single and multiple recession defects respectively [12].

The PT technique was chosen as the prime modality of treatment because of the relative simplicity of the technique, minimally invasive nature that reduces the post-operative discomfort for the patients, and improved aesthetic results. Chambrone *et al.* in 2010 in a Cochrane systematic review recommended that CTG procedures are adequate to achieve recession coverage as well as to increase the WKG [13].

To obtain the CTG, the single incision technique proposed by Ribeiro *et al.* in 2008 was exercised because it allows primary closure of the donor site (palate) [7]. Accomplishing primary closure accelerates the healing, reduces donor site morbidity, post-operative pain and discomfort [14].

Therefore, in the present study, the PT technique in combination with CTG procured using single incision technique was employed for GR coverage. The clinical outcome of this case series showed that PRC achieved at 3 months was 88.07% and the results were reasonably stable even at 6 months with the PRC of 86.09%. Furthermore, the RES was 9.1±1.0. This is in accordance with a case report by Moussa EW in 2017, where recession defects with mild interdental soft tissue and bone loss were treated with the PT or coronally advanced flap (CAF) technique. The results of the case report recommended that the PT approach deliver exceptional aesthetic outcome when compared to CAF [6].

Conclusion

Miller's class III GR defects can be successfully managed using PT in combination with CTG. The results were stable for over a period of 6 months. Single-incision technique for obtaining CTG further improves the healing of the donor site as well as provides increased patient comfort. To the best of our knowledge, this is the first study that has applied PT

technique with CTG procured using the minimally invasive single-incision technique for the management of Miller's class III recession defects. Further long-term studies are required to substantiate the results of the present study.

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Conflict of interest: None declared

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