Original Article

Evaluation of root coverage with pedicled buccal fat pad in class III and class IV gingival recession defects

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Abstract

Background: Gingival recession (GR) is a common clinical feature of periodontal disease and is an undesirable condition. More than 50% of the population has one or more sites with GR ≥ 1 mm. **Material and Methods:** In this study 15 subjects were subjected to initial periodontal therapy such as ultrasonic scaling and root planning with hand instruments and curettes. Patient is motivated for home care. The buccal fat pad is harvested and sutured in the gingival recession area and followed up for 6 months and root coverage was calculated. **Results:** At baseline mean recession of 5.60 ± 1.18 mm, probing depth of 0.73 ± 0.59 mm, clinical attachment loss of 6.40 ± 1.18 mm were recorded. At the end of 6 months, the mean recession was reduced from 5.60 ± 1.18 mm to 2.87 ± 0.74 mm, probing depth was increased from 0.73 ± 0.59 mm to 1.73 ± 0.70 mm and clinical attachment loss was decreased from 6.40 ± 1.18 mm to 4.53 ± 0.83 mm.The difference between baseline score and six months score for all three parameters are statistically significant. **Conclusion:** Buccal fat pad is a predictable procedure to cover Miller's class III and class IV gingival recession defects. There was a definitive improvement in clinical parameters (reduction in gingival recession, increased probing depth, gain in clinical attachment) after 6 months. There was 46.78% improvement in root coverage which was statistically significant.

Keywords: Buccal fat pad, clinical attachment gain, flap surgery, gingival recession

Introduction

Gingival recession (GR) is a common clinical feature of periodontal disease and an undesirable condition.[1] More than 50% of the population has one or more sites with GR ≥1 mm.[2] The extent of GR increases with advancing age and in males, smokers, and buccal sites, especially the canine tooth, and in sites with supra and subgingival calculus.[3]

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It has been proposed that GR is multifactorial, associated with anatomic factors, such as bone dehiscence, malpositioning of teeth, orthodontic tooth movement, muscle pull, or direct trauma associated with malocclusion or physiologic (aging) or pathologic factors (where it occurs as a part of the pathogenesis of periodontal disease or smoking).[4-6] Gorman[7] concluded that tooth malalignment and vigorous tooth brushing are the most common factors associated with recession. Sangnes and Gjermo[8] confirmed that different types of traumatic injuries may result in a variety of gingival lesions.

Several surgical techniques have been described for their management with varied clinical outcomes.[9] The surgical procedures that have been proposed to cover denuded root

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surfaces are free gingival grafts, laterally displaced flaps, coronally advanced flaps and subepithelial connective tissue grafts, guided tissue regeneration, pouch and tunnel technique.

Buccal fat pad (BFP) is a specially organized tissue. Its fat tissue is a specialized type of fat termed syssarcosis, a fat that enhances intermuscular motion.[10-12] Although fat tissue cannot induce osteoblasts, the PBFP (pedicled buccal fat pad) graft has a strong resistance to infection, with little necrosis and absorption.

Methodology

Inclusion criteria

a. Miller's Class III and Class IV GR defects in maxillary molars
b. Systemically healthy subjects.

Exclusion criteria

a. Inflammatory periodontal disease
b. Previous surgical attempts to correct GR
c. Current anticoagulation treatment or antibiotics
d. Smokers
e. Pregnant women
f. Presence of apical radiolucency or caries in the areas to be treated.

Sample distribution

A total of 15 subjects were treated. All patients were subjected to initial periodontal therapy and adherent to maintenance care for at least 1 month before the surgical procedure.

Patients underwent non-surgical periodontal treatment consisting of supragingival and subgingival scaling and root planning (SRP) by ultrasonic instruments and hand curettes and motivational instructions on oral home care.

Parameters recorded were GR, probing depth (PD), and clinical attachment loss (CAL) at baseline and after 6 months post-operatively.

Surgical procedure

All patients were advised to take prophylactic antibiotic Amoxicillin 500 mg 1 hour before the surgical procedure. Chlorhexidine 0.2% was used as a presurgical rinse. Anesthesia was obtained using 2% lignocaine HCl with 1:80,000 epinephrines.

Preparation of the donor site (BFP)

A 2-cm horizontal incision was made through the mucoperiosteal flap at the base of the buccal flap that extended backward from above the upper second molar tooth and allowed access to the PBFP. Blunt dissection through the buccinator and lose surrounding fascia allowed the PBFP to be exposed to the mouth. The body of the BFP and the buccal extension were gently mobilized by blunt dissection, taking care not to disrupt the delicate capsule and vascular plexus and to preserve as wide a base as possible. The PBFP could easily spread over the maxillary roots as far anteriorly as the premolar tooth region.

Preparation of the recipient site

A crevicular incision was placed from the distal surface of premolar to mesial surface of the third molar, concomitantly and a vertical incision was done at the distal surface of premolar and full-thickness periosteal flap was elevated.

Preparation of the root surface

The root surface was instrumented with hand and ultrasonic instruments thoroughly and irrigated with saline solution to remove any remaining detached fragments from the defect and surgical field.

Placement of PBFP and suturing

Care full incision is given and the buccal pad of fat is harvested [Figure 1]. The buccal pad of fat was positioned carefully on the buccal surface of the desired tooth and secured over the root surface using 3-0 vicryl sling sutures [Figure 2]. After which the full-thickness periosteal flap was repositioned and sutured with the same sutures.

Post-surgical care

The patients were given antibiotic (Amoxicillin 500 mg thrice daily for 5 days) and analgesic (Aceclofenac 100 mg and serratiopeptidase 15 mg thrice daily for 3 days). Patients were advised to use a cold compress extra-orally to minimize swelling in the immediate post-operative period. The patients were instructed to continue their regular home oral hygiene care, except in the surgical area, where tooth brushing and flossing were discontinued for the first 2 weeks after surgery. Plaque control was maintained using chlorhexidine gluconate 0.2% twice a day for 2 weeks and patients were instructed to eat a soft diet.

After 2 weeks, a gentle tooth brushing with a soft bristle brush was initiated. The sutures were removed and the surgical area was irrigated copiously with saline.

Maintenance Schedule

Following surgery, all patients were seen the next day and then weekly for the first 2 weeks and then after 1, 3 and 6 months [Figure 3]. Maintenance visits consisted of reinforcement of oral hygiene procedures and professional supragingival scaling.

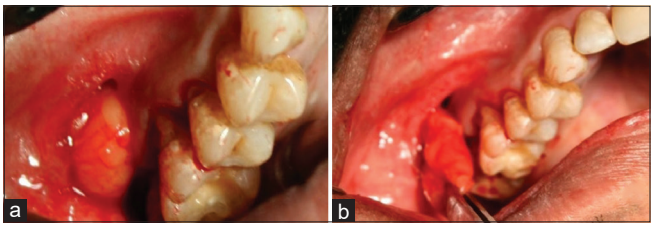

Figure 1: (a): Incision of BFP, (b): Harvesting of BFP

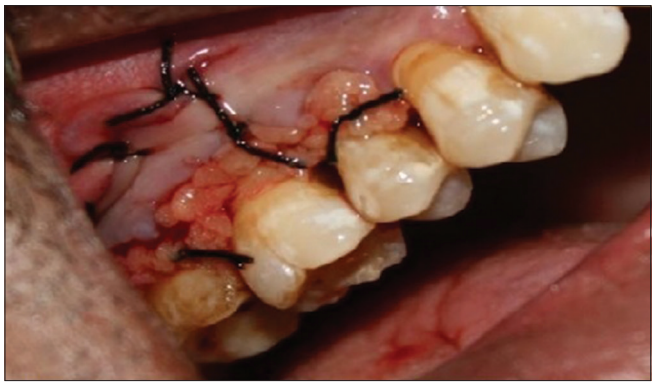

Figure 2: Placement and suturing of BFP in the GR area

Statistical analysis

Wilcoxon Signed Rank Test was used to compare recession, PD, CAL, changes at baseline and 6 months.

The percentage of root coverage was calculated as follows:

([initial RD - final RD]/initial RD) × 100.

Results

The present study was carried out to evaluate the root coverage of Class III and Class IV GR defects using PBFP.

The results reported were as follows

The clinical parameters recession, PD, CAL at baseline and 6 months at mesial (M), mid-buccal (MB) and distal (D) sites on the buccal aspect of the tooth were recorded. Reduction of recession resulted in a significant gain in CAL and PD at the end of 6 months. The difference between baseline score and 6 months score for all three parameters were statistically significant.

Comparison between mean clinical parameters in the study group

Mean and standard deviation of recession, PD, CAL at baseline and 6 months were recorded [Table 1].

At baseline mean recession of 5.60 ± 1.18 mm, PD of 0.73 ± 0.59 mm and CAL of 6.40 ± 1.18 mm was recorded. At the end of 6 months, the mean recession was reduced from 5.60 ± 1.18 mm to 2.87 ± 0.74 mm, PD was increased from 0.73 ± 0.59 mm to 1.73 ± 0.70 mm and CAL was decreased from 6.40 ± 1.18 mm to 4.53 ± 0.83 mm. The difference between the baseline score and 6 months score for all three parameters are statistically significant [Table 1].

Discussion

Primary healthcare provided in the community for people making an initial approach to a medical practitioner or clinic for advice or treatment. Periodontal diseases comprise a variety of conditions affecting the health of the periodontium. GR

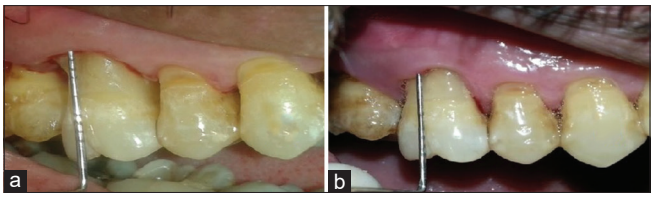

Figure 3: (a): Pre-operative depth of GR, (b): 6 months follow-up depth of GR

Table 1: Comparison between mean clinical parameters in the study group

Parameter	*n*	Baseline (Mean±SD)	6 Months (Mean±SD)	*P*
Recession	15	5.60±1.18	2.87±0.74	0.001
Probing depth	15	0.73±0.59	1.73±0.70	0.000
Clinical attachment loss	15	6.40±1.18	4.53±0.83	0.001

is a common clinical entity observed in patient populations regardless of their age and ethnicity. As defined by the American Academy of Periodontology, GR is the displacement of marginal periodontal tissues apical to the cemento–enamel junction. From the clinical standpoint, GR is measured as the distance from CEJ to the most apical extension of gingival margin.

Utilization of graft/flap surgery is the primary approach by the physicians/doctors in treating Miller's Class III and Class IV GR. Utilization of BFP has been shown a proven result in treating such cases hence referred to primary care in treating these types of GR.

GR may result due to anatomical factors like the presence of inadequate attached gingiva, high frenal attachment, malpositioning of teeth, osseous dehiscence, shallow vestibule, and thin periodontal biotype or pathological factors like the presence of recurrent inflammation, oral pathologies, and iatrogenic factors or materials (e.g., traumatic tooth brushing, self-inflicted injury and chemical erosion).

Frenal and muscle attachments that encroach on the marginal gingiva distend the gingival sulcus, fostering plaque accumulation, increasing the rate of progression of periodontal recession, and cause their recurrence after treatment. The problem is more common on facial surfaces, but it may also occur on the lingual surface.

Orthodontic tooth movement through a thin buccal osseous plate leading to dehiscence beneath a thin gingival tissue margin can cause a recession and/or loss of the gingiva.[13-15]

GR may represent a problem for the patient because of poor esthetics, pain, root sensitivity, root caries, root abrasion, plaque retention, gingival bleeding, and/or a fear of tooth loss adversely affect patient's overall well-being.[3,4]

Two main classification systems are used to determine the severity of the lesion. The classification by Sullivan and Atkins categorized the GR defects into deep–wide, shallow–wide, deep–narrow and shallow–narrow.[16]

In contrast, the Miller classification categorized GR defects into four classes – Class I, Class II, Class III, and Class IV – based on the marginal tissue level and existing bone and soft tissue support. In Class I recession defects, the recession does not reach the mucogingival junction (and there is no loss of interproximal tissue). In Class II defects, the recession extends to/beyond the mucogingival junction, but there is no loss of interproximal tissue. Therefore, complete root coverage can be achieved. In Class III and Class IV categories, the marginal GR extends to or beyond the mucogingival junction and there is a loss of interproximal periodontal tissue, thus leading to unpredictable degrees of root coverage.

This classification provided the expected clinical success rate for root coverage and also emphasized the importance of interproximal bone support in ensuring treatment success.[17]

The superficial layers lose their adhesiveness and spontaneously desquamate or are easily dislodged by sustained toothbrush abuse. The inflammatory changes in the subepithelial connective tissue are due to injury, are induced by plaque, or more likely, resulted from a combined process. Plaque accumulation in the narrow clefts can perpetuate inflammatory changes in the connective tissue core, which permits penetration of a proliferating dentogingival epithelium until it coalesces with oral epithelia. Moreover, the loss of proper nutrition to the enlarged epithelial layer enhances the loss of adhesiveness and encourages desquamation and/or physical removal.[18]

To overcome these adverse consequences, many materials, as well as surgical techniques, have been developed. Conventional procedures proposed for root coverage include the laterally positioned flap,[19] the coronally advanced flap,[20] the double papillae flap,[21] the semilunar coronally positioned flap,[22] the free gingival autograft[16], and the subepithelial connective tissue graft.[23] In terms of achieving root coverage, these techniques have achieved a wide range of success rates, as reported in several systematic reviews.[24-28]

Guided tissue regeneration (GTR) has been shown in multiple clinical studies to be effective in producing root coverage.[9] Acellular dermal matrix (Life Cell) has been used with a coronally positioned graft to obtain root coverage.[29]

Most reports on root coverage have focused on the treatment of Classes I and II recessions.[30] Although there is a general agreement on the lack of predictability of the success and the inability to obtain 100% coverage in Class III and Class IV recessions, very few reports have focused on the predictability and factors governing the degree of coverage expected in these situations. The predominant goal of therapy in this patient group is a functional restoration of the periodontal attachment apparatus rather than esthetics.

The BFP was used in this study for root coverage for the following reasons:

1. It can be easily mobilized, stabilized, adapted, and sutured
2. Good vascularization, it has an internal microvascular net that ensures the survival of the flap after relocation[31-33] with no need for microvascular anastomosis
3. Ease of access
4. The proximity between the donor site and the recipient site
5. BFP has a strong anti-infective property and can reconstruct the site with little or no necrosis
6. Its fat tissue is a specialized type of fat termed syssarcosis, a fat that enhances intermuscular motion
7. It is not subjected to lipid metabolism, unlike subcutaneous fat, where it has a different rhythm of lipolysis and maintains its volume and structure over a long time
8. It tends to re-epithelialize and provides excellent color and texture match
   Histologically, it was documented that the transpositioned part of the PBFP flap will be re-epithelialized[33,34] and transform into parakeratotic stratified squamous epithelium with dense connective tissue without fat cells[35,36]
9. Pyo *et al.* proved in their study the presence of stem cells within the BFP that can help in periodontal regeneration[37]
10. Low rate of complications.

Potential complications of using PBFP are minimal, although hematoma, infection, and even facial nerve injury have been reported. These can be avoided by a careful incision in the buccinator fascia and limited dissection within the masticatory spaces. Additionally, partial necrosis and excessive scar tissue formation may be seen on the healing side. Rapidis *et al.*[36] reviewed complications that occurred after using PBFP and reported that complication rates were rather low (partial necrosis 7.9%, infection 0.6%, excessive scarring 5.4%, and other 2.4%). The use of the PBFP is not recommended in patients with malar hypoplasia or patients with thin cheeks, as this may accentuate a gaunt appearance, producing hollowing within the cheek. Also, it is not recommended for patients with Down's syndrome.

Although when properly dissected and mobilized, a buccal pad of fat graft provides adequately sized pedicled graft limitations do exist following the size of the maxillary defects.[38] If the surgical defects measure more than 4 × 4 × 3 cm, the likelihood of partial dehiscence of the flap is high. This can be attributed to the impaired vascularity of the stretched ends of the flap that are sutured to the remaining palatal mucosa.

Predictability of root coverage procedures is dependent on several factors such as anatomical factors, the surgical skill of the operator, and post-operative maintenance of the patients. Complete root coverage has been reported in Classes I and II GRs with connective tissue grafts and is usually considered the gold standard.[39]

Adequate blood supply from the tissues adjacent to the graft bed, the level of the interproximal gingival tissue, 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 the graft and the recipient site, and the loss of interdental bone, that is characteristic of Class III recessions, resist any attempts at complete root coverage.[30]

Even with the utilization of non-PBFP graft showed more improvement in treating the GR than connective tissue graft.[40]

The application of adipose-derived stem cells isolated from the BFP in combination with natural bovine bone mineral can be considered as an efficient treatment for bone regeneration in large alveolar bone defects.[41] This shows the effectiveness of the BFP in regeneration.

Pedicled buccal fat pad showed promising results as the treatment modality the management of Class-II and Class-III gingival recession of maxillary posterior teeth.[42]

Conclusion

The present study was conducted to evaluate the results obtained using a PBFP for root coverage in Class III and Class IV recession defects. Fifteen healthy subjects with Miller's Class III or Class IV GRs in maxillary molars were treated using the PBFP. Clinical parameters, including depth of GR, PD, and CAL were assessed. Patients were followed from baseline to 6 months. The following conclusions can be drawn from the study:

- BFP is a predictable procedure to cover Miller's Class III and Class IV GR defects
- There was a definitive improvement in clinical parameters (reduction in GR, increased PD, and gain in clinical attachment) after 6 months
- There was a 46.78% improvement in root coverage which was statistically significant.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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