

Treatment of Severe Gingival Recession Using Pedicled Buccal Fat Pad: Histological and Clinical Findings

Şiddetli Dişeti Çekilmesinin Saplı Bukkal Yağ Dokusu Kullanılarak Tedavisi: Histolojik ve Klinik Bulgular

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Abstract

There are a lot of techniques for treatment of gingival recessions. However, Miller class III and IV type recession defects have poor prognosis. The Buccal Fat Pad (BFP) is a specialized tissue that can be able to transform into bone, cartilage, fat and muscle. In this case report, the treatment of two cases with severe gingival recessions using pedicled BFP, was introduced. During surgery, full thickness flap was elevated at recipient site. The pedicled BFP was exposed using proper surgical technique. The body mass of BFP was removed over and sutured to mucosa. Small amount of fat tissue was obtained for histological analysis. Vascularized flap was placed at buccal surface of 1st molar tooth and sutured. The buccal flep also was coronally positioned and sutured. The gingival recessions were decreased for both of the cases at the end of 12 weeks. The clinical periodontal parameters and mobility were improved, the keratinized gingival tissues were observed clearly. A small amount of gingival tissue that had been obtained during gingivoplasty after 3 months, was kept for histological analysis. The vascularized fat tissue was seen at the first histological sample. Type 1 collagen fibers and fibroblasts with epithelization and papilla formation in epithelium, was observed at the second sample. The BFP may provide root coverage for the treatment of gingival recessions at maxillary molars and premolars by positive affecting the gingival health. The prospective, controlled clinic trials are needed at this area.

Keywords: Buccal fat pad, gingival recession, root coverage

Öz

Dişeti çekilmelerinin tedavisinde pek çok yöntem vardır. Ancak Miller III ve Miller IV tip dişeti çekilmeleri zayıf prognoza sahiptir. Bukkal Yağ Dokusu (BYD), kemik, kıkırdak, yağ veya kasa dönüşebilen özel bir yağ dokusudur. Bu vaka raporunda şiddetli dişeti çekilmesi olan 2 hastanın saplı BYD kullanılarak tedavisi anlatılmıştır. Uygulama esnasında cerrahi aşamada alıcı alanda tam kalınlık flep kaldırılmıştır. Saplı BYD uygun cerrahi teknikte açığa çıkarılmıştır. BYD'nin gövdesi hareketlendirilerek mukozaya yakın şekilde dikilmiştir. Küçük bir parça yağ dokusu histolojik inceleme için ayrılmıştır. Damarlı flep üst 1. büyük azı dişinin bukkal yüzeyine sıkıca yerleştirilerek dikilmiştir. Bukkal flep de koronal şekilde pozisyonlandırılarak dikilmiştir. On iki hafta sonunda her iki vakada da dişeti çekilmesi azalmıştır. Klinik periodontal parametrelerde ve mobilitede iyileşme görülmüş; her iki vakada da keratinize dişeti dokusu belirgin şekilde izlenmiştir. Üç ay sonraki gingivoplasti aşamasında elde edilen küçük bir parça dişeti, histolojik inceleme için ayrılmış ve ilk histolojik örnekte damarlı yağ dokusu izlenmiştir. Elde edilen 2. örnekte ise Tip I kollajen lifler ve fibroblastlarla birlikte epitelizeasyon ve epitel içinde papilla oluşumu izlenmiştir. BYD kullanımı, üst çene azı ve küçük azı dişlerinde, dişeti sağlığına olumlu etki ederek, kök yüzeyi örtülmesini sağlayabilir. Bu konuda ileri dönük, kontrollü, klinik çalışmalara ihtiyaç vardır.

Anahtar kelimeler: Bukkal yağ dokusu, dişeti çekilmesi, kök yüzeyi örtülmesi

INTRODUCTION

Gingival recession (GR) is a common condition, and its prevalence increases with age. It may cause root sensitivity, root caries, plaque retention, and poor esthetic results (1). The root coverage procedures aim to develop esthetics, decrease root hypersensitivity, and manage caries on the root surface as well as cervical abrasions. Several surgical techniques such as connective tissue grafts, free gingival grafts, and coronally advanced flap techniques have been widely used to treat the exposed root surface. However, the treatment of Miller III and Miller IV conditions is more complex and has poor prognosis (2, 3). The buccal fat pad (BFP) was first described by Heister in 1732, and the true fatty nature of this tissue was defined by Bichat in 1802 (4). BFP is a mass of specialized adipose tissue containing mesenchymal stem cells that have the potential to differentiate into the bone, muscle, or cartilage (5). With regard to a pedicled graft, the anatomical region is consistent, and surgery has no influence on its appearance or function (6). BFP can play a valuable surgical role, serving as a well-vascularized, smoothly accessible as local flap for oral reconstruction (4).

This case report describes the use of BFP for the treatment of Miller Class III GR.

CASE PRESENTATIONS

Case 1

A 47-year-old systemically healthy male presented to the Department of Periodontology, Karadeniz Technical University, with complaints of sensitivity, GR, and mobility in the maxillary right first molar. Clinical examination showed Miller Class III GR and 9-mm GR without keratinized gingiva on the distobuccal side of the maxillary first molar (Figure 1a). All clinical indices, including the gingival index (GI), plaque index (PI), probing depth (PD), bleeding on probing (BOP), clinical attachment level (CAL), GR, and tooth mobility, were recorded at baseline.

After phase I periodontal therapy, the surgical treatment plan was explained, and informed written and verbal consent was obtained.

Case 2

A 47-year-old systemically healthy female presented to the Department of Periodontology, Karadeniz Technical University, with a complaint of sensitivity in the maxillary first left molar. Miller Class III GR and 5-mm GR without keratinized gingiva were identified on the mesiobuccal side of the maxillary left molar (Figure 2a). Following phase I periodontal therapy, the surgical treatment plan was explained, and informed verbal and written consent was obtained.

Surgical Procedures

Local anesthesia (80 mg articaine HCl with 0.012 epinephrine HCl) was applied, and then, a full-thickness flap was reflected with a sulcular incision at the recipient site. The flap was dissected to expose the zygomatic buttress and to reach the buccinator muscle attachments. Then, a 2 cm horizontal incision was made in the fascia between the buccinator muscle and masseteric muscle to expose BFP. Blunt dissection was performed through the buccinator and loose surrounding fascia reaching BFP to expose it in the mouth. The body of BFP was tenderly mobilized, being careful not to distort the fragile capsule, and it was sutured close to the mucosa. A small amount of fat tissue separated during BFP removal was stored in formalin solution for histological examination. The vascularized flap was secured to the buccal surface of the maxillary first molar and sutured with nonabsorbable 4-0 braided silk sutures (20 mm, cutting edge, Dogsan®, Trabzon, Turkey) and reabsorbable 5-0 polyglycolic acid sutures (16 mm, cutting edge, Dogsan®, Trabzon, Turkey) to the mucosal edges. The buccal flap was coronally positioned and sutured with no tension. Antibiotics (amoxicillin clavulanic acid 1000 mg, Augmentin-BID® 1000 mg; GlaxoSmithKline, Brentford, UK), oral analgesics (dexketoprofen trometamol 25 mg, Arvels®, İbrahim Etem Ulagay Pharmaceutical Industry, İstanbul, Turkey) twice per day, and chlorhexidine (0.12% chlorhexidine digluconate, Kloroben; Drogan®, Ankara, Turkey) mouthwash twice per day for 7 days were prescribed. The patients were warned to avoid aggressive brushing in the surgical area for 4 weeks. The sutures were removed 10 days after the surgery (Figure 1b, 2b). The patients were followed every week up to 4 weeks.

Histopathological Evaluation

Gingival specimens were kept in Bouin's solution for 3 days in the dark at room temperature. These samples were then kept in the following solutions: 70% ethanol (1 day), 90% ethanol (1 day), 96% ethanol (1 day), 100% ethanol (1 day), 100% ethanol (1 h), xylene (5 min, thrice). Tissue samples were placed in liquid paraffin wax (58°C) thrice

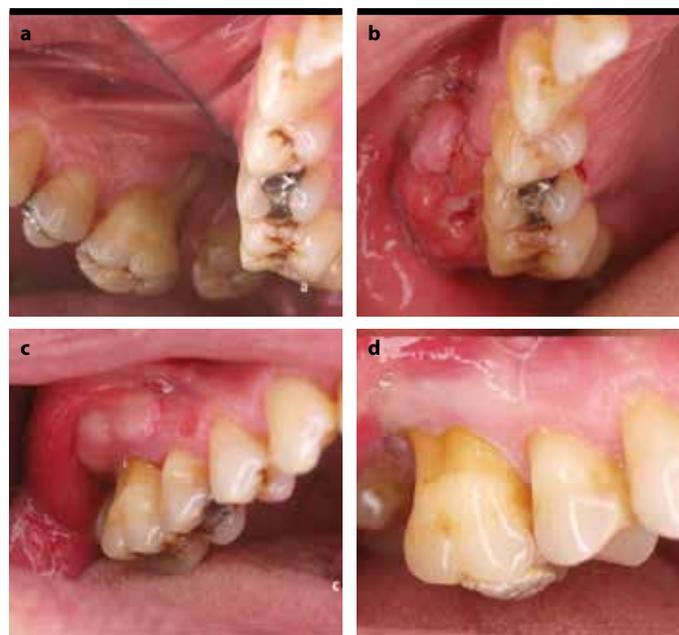


Figure 1. a-d. (a) Pre-operative status of case 1, (b) 10 days after surgery of case 1, (c) 12 weeks after surgery of case 1, (d) 24 weeks after surgery of case 1

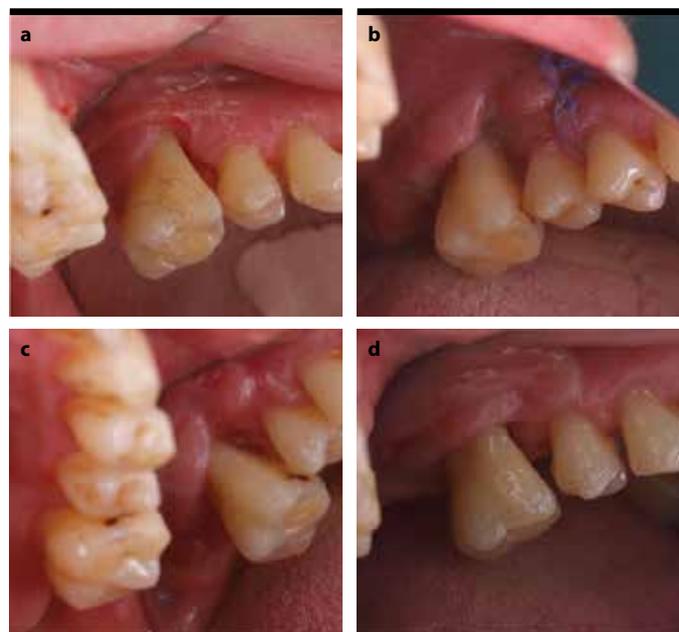


Figure 2. a-d. (a) Pre-operative status of case 2, (b) 10 days after surgery of case 2 (c) 12 weeks after surgery of case 2, (d) 24 weeks after surgery of case 2

for 15 min, left in paraffin wax for another 2 h, and embedded in tissue blocks. Tissue sections [5 cut using an automatic microtome (Leica RM 2255, Leica, Germany)] were treated with standard procedures, stained with hematoxylin and eosin (H&E), and examined under an Olympus BX51 (Tokyo, Japan) photomicroscope equipped with an Olympus DP 71 (Tokyo, Japan) camera.

Clinical periodontal measurements are shown in Table 1, 2. At the end of 12 weeks, clinical attachment gain was found, and GR was reduced in both cases. GI, PI, PD, BOP, CAL, GR, and tooth mobility improved

Table 1. Clinical periodontal parameters of case 1

	Before phase I therapy			Post-op 3 th month			Post-op 6 th month		
	db	m	mb	db	m	mb	db	m	mb
Gingival recession	9	3	1	4	4	3	4	4	3
Width of keratinized gingiva	0	1	2	5	5	5	5	5	5
PD	3	1	1	1	1	2	1	1	2
CAL	12	4	2	5	5	5	5	5	5
BOP	+			-			-		
GI	2			0			0		
PI	3			0			0		
Tooth mobility	1			0			0		

db: disto-buccal; mb: mid-buccal; m: mesio-buccal; PD: probing depth; CAL: clinical attachment loss; BOP: bleeding on probing; GI: gingival index; PI: plaque index

Table 2. Clinical periodontal parameters of case 2

	Before phase I therapy			Post-op 3 th month			Post-op 6 th month		
	db	m	mb	db	m	mb	db	m	mb
Gingival recession	3	4	5	4	4	4	4	4	4
Width of keratinized gingiva	3	3	0	3	3	3	3	3	3
PD	1	1	3	1	1	2	1	1	2
CAL	4	5	8	5	5	6	5	5	6
BOP	+			-			-		
GI	2			0			0		
PI	1			0			0		
Tooth mobility	1			1			1		

db: disto-buccal; mb: mid-buccal; m: mesio-buccal; PD: probing depth; CAL: clinical attachment loss; BOP: bleeding on probing; GI: gingival index; PI: plaque index

(Figure 1c, 2c). Partial root coverage was achieved in both cases. The root coverage percentages were approximately 45% and 20% for cases I and II, respectively. Importantly, some keratinized gingival tissues were evident in both cases (5 mm and 3 mm, respectively). The first patient was evaluated, and gingivoplasty was performed for recontouring the gingiva after 3 months. A small amount of gingiva obtained during the procedure was used for histological examination. In addition, histological sections were obtained during surgery and at 3 months after surgery (Figure 3, 4). Figure 3 shows a histological view of BFP taken from patient 1. Figure 4 shows the histological view of gingival tissue obtained during gingivoplasty at the third month. After 6 months, the periodontal indices and width of the keratinized gingiva remained stable (Figure 1d, 2d).

Microscopic Evaluation

Findings of histological evaluations of the tissue sections are shown in Figure 3, 4. Fat tissue with vascularization can be observed in Figure 3. There was no epithelialization in this section. However, epithelialization and papilla formation in the epithelium can be observed in Figure 4. Type 1 collagen fibers and fibroblasts were also observed in this section.

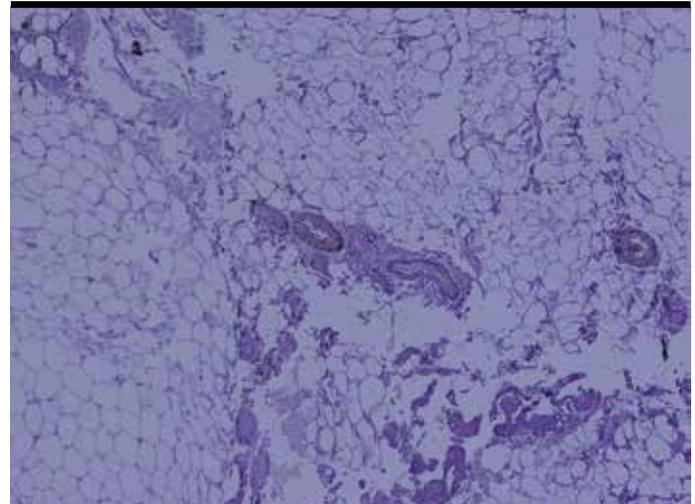


Figure 3. Histological view of BFP of 1st patient

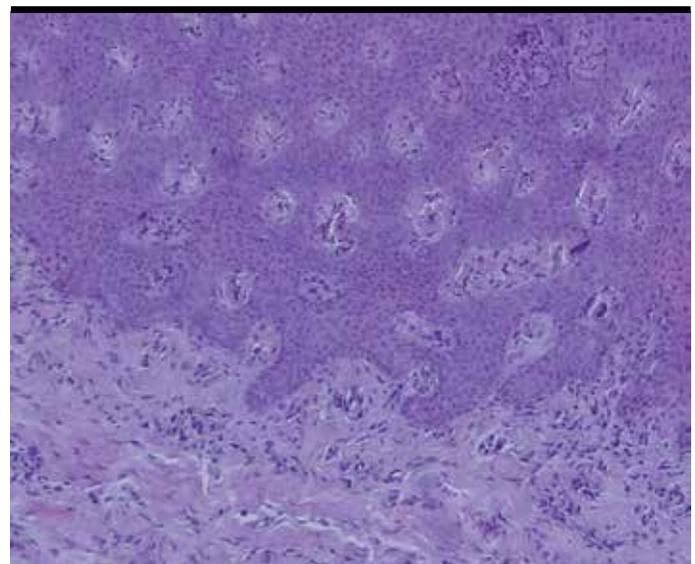


Figure 4. Histological view of gingival tissue obtained during gingivoplasty

DISCUSSION

GR can be treated with different surgical procedures. However, these surgical techniques are not suitable for sites with severe GR (6-8). Partial root coverage can be achieved for Miller III and Miller IV cases. However, the treatment of such recession defects with current techniques has very poor prognosis.

BFP is formed by a central body and four extensions: buccal, pterygoid, pterygopalatine, and temporal (9). BFP obtains rich blood supply from the buccal and deep temporal branches of the maxillary artery, transverse facial branches of the superficial temporal artery, and branches of the facial artery. The high success rate of pedicled BFP may be accounted for by its rich blood supply. BFP plays many roles such as preserving negative pressure in newborns during sucking, increasing intermuscular precession, and conserving neurovascular bundles (9). It can be used for various surgical site oral reconstruction needs such as closure of palatal defects, oro-antral fistulas, postextraction defects; temporomandibular joint reconstruction; and treatment of oral submucous fibrosis. In addition, it can be used as a membrane in sinus augmentation. Moreover, it can be used for

root coverage procedures, particularly in the posterior maxilla. BFP has several advantages. It can be mobilized into the desired position for coverage of the buccal aspect of upper molars. It has an excellent blood supply, with minimal donor site morbidity and low rate of complications. (9). Patient discomfort is also usually minimal because there is no need for a second surgical region for graft harvesting. There are also some disadvantages of this technique, e.g., the risk of donor site infection or postoperative swelling and the need for gingivoplasty. In our study, the patients had postoperative swelling for 5 days, and the gingivoplasty procedure was performed after 12 weeks. This is the first case report presenting histological analysis on remodeling of BFP. Histologically, the transpositioned part of BFP becomes reepithelialized and transforms into parakeratotic stratified squamous epithelium with dense connective tissue without fat cells (5, 10). Histological transformation of BFP to the epithelium and connective tissue was observed in the photomicrographs in our cases. There are only three case reports in the literature about the use of BFP for root coverage. El Haddad used BFP to treat a Miller IV defect, which provided a notable amount of keratinized tissue for root coverage (9). In 2010, Kumari et al. (6) established this technique for root coverage of a Miller III recession defect on the maxillary right molar. The clinical attachment gain was 4 mm at 6 months. Finally, in 2014, Agarwal et al. (11) reported a case and established this technique for treating a Miller IV recession defect. They were able to achieve partial root coverage, with a 4-mm attachment gain. In our study, in the first case, a 7-mm clinical attachment gain was found at 3 months, similar to the findings of previous studies, and GR declined to 4 mm. In the second case, a 2-mm clinical attachment gain was found at 3 months, and the width of the keratinized gingiva gain was 3 mm. The values remained stable at 6 months, and the keratinized gingiva seemed healthy. There was no clinical sign of inflammation in the region. Keratinized tissue is key for periodontal health and the prognosis of the tooth. The tissue enables protection against further GR. Although complete root coverage was not achieved, a considerable amount of keratinized tissue was present in our patients. GI, PI, and BOP scores were improved at 3 months. It can be concluded that the patients could eliminate dental plaque more effectively in the region than they did before, and gingival inflammation was resolved by 3 months. The combination of this technique with other biomaterials such as Emdogain, platelet-rich fibrin, and acellular dermal matrix may be useful for root coverage procedures. Finally, there is a need of more research on the treatment of Miller III and IV recession defects.

CONCLUSION

The use of BFP may be a valuable procedure for severe recession defects in maxillary molar and premolar teeth. This technique improved gingival health. However, further studies and longer follow-up periods are required.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

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