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Olgu Sunumu / Case Report

The Effectiveness of Using Platelet Rich Fibrin with Open Flap Debridement in Treatment of Intra-Bony Defects: A Case Series

Kemik İçi Defektlerin Tedavisinde Açık Flep Debridmanı ile Trombositten Zengin Fibrin Kullanımının Etkinliği: Bir Olgu Serisi

Anas ALSAFADI[1], Basem ALSHUJAA[1], Dicle ALTINDAL[1]

[1]*Van Yüzüncü Yıl Üniversitesi Diş Hekimliği Fakültesi, Periodontoloji AD, Türkiye*

ABSTRACT: Periodontitis, which is characterized by bacterial inflammation and periodontal damage, is a primary cause of tooth loss. The main objective of periodontal treatment is not only to slow down the progression of periodontal problem, but also to regenerate the architectural and functional integrity of the periodontal tissue, which includes the formation of new cementum together with a new connective tissue and newly formed bone. Thorough removal of calculus and granulation tissues is a critical part of obtaining a biologically appropriate tooth surface in the management of periodontitis, which is can achieved surgically by open flap debridement procedure. Surgical access has proved to improve the effectiveness of scaling and root planning procedure. Platelet-rich fibrin is a second-generation platelet concentrate which contains abundant amount of growth factors and can be used effectively in periodontal regeneration procedures. The goal of this case series is to show the efficiency of platelet-rich fibrin in the management of patients who have a deep intra-bony pocket by placing a freshly prepared platelet-rich fibrin clot inside intra-bony defect following open flap debridement. Clinical and radiographic follow-up were performed after a 2-year, and revealed a clinical attachment level gain, probing depth reduction, and bone fill indicating successful outcomes.

Keywords: Bone regeneration, platelet-rich fibrin, surgical flaps

ÖZET: Periodontitis diş kaybının önemli bir nedenidir ve bu durum bakteri iltihabı ve periodontal yıkımla karakterizedir. Periodontal tedavinin nihai amacı sadece periodontal hastalığın gelişimini yavaşlatmak değil, aynı zamanda yeni sement oluşumu ile birlikte yeni oluşan kemik ve sement arasında yeni bir bağ dokusu ataşmanı içeren periodontal kompleksin mimari ve fonksiyonel bütünlüğünü yeniden oluşturmaktır. Diş taşı ve granülasyon dokusunun tamamen çıkarılması, periodontitis tedavisinde açık flep debridman prosedürü ile elde edilen biyolojik olarak kabul edilebilir bir diş yüzeyi elde etmenin birincil parçasıdır. Cerrahi erişimin diş taşı temizliği ve kök yüzey düzleştirilmesi etkinliğini iyileştirdiği gösterilmiştir. Son zamanlarda büyüme faktörlerinden zengin ikinci nesil bir trombosit konsantresi olan trombositten zengin fibrin, periodontal rejenerasyon prosedüründe kullanılmaktadır. Bu vaka serisinin amacı, derin kemik içi defekt hastalarının tedavisinde trombositten zengin fibrin'in etkinliğini tanımlamaktır. Debridmanın ardından kemik defekti içine taze hazırlanmış bir otolog trombositten zengin fibrin pıhtısı yerleştirilmiştir. Klinik ve radyografik takipler, ağrı yokluğu, klinik ataşman seviyesinde artış, sondalama derinliğinde azalma ve başarılı sonucu gösteren kemik rejenerasyonu ortaya çıkaran düzenli aralıklarla gerçekleştirilmiştir.

Anahtar Kelimeler: Cerrahi flepler, kemik rejenerasyonu, trombositten zengin fibrin

Sorumlu Yazar: Dt. Anas Alsafadi, e mail: doctoranasalsafadi@gmail.com

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INTRODUCTION

Periodontitis is a disorder of the periodontal tissue characterized by the irreversible damage of connective tissue attachment and alveolar bone support. The objectives of any periodontal treatment are to manage the bacterial inflammation, prevent disease progression and reconstruct lost periodontal tissues (1). Although the efficacy of scaling and planing (SRP) or surgical management for periodontal pockets, as well as routine maintenance treatment, in cases of moderate to severe periodontal disease, has been well established, the treatment success is determined by the capability of treatment to shows improvement in bony defects (2).

Periodontal disease can lead to the formation of intra-bony defects (IBDs) which described as distinct bony pockets with a base found apical to the alveolar crest and could be bordered by one, two, or three bony walls or a combination (3). Surgical intervention is considered the best option for treatment of deep IBDs, which have not improved after achievement of initial periodontal treatment (4).

Open-flap debridement (OFD) is considered the first technique to be used among several surgical methods utilized to obtain appropriate biological environments essential for periodontal regenerative procedures and has proved successful outcomes in the surgical management of IBDs (5,6). It is generally known that the regeneration of tissues damaged by periodontal problems can't be obtained by conventional open flap debridement alone (7). At present, periodontal IBDs can be managed surgically by a variety of techniques, including OFD, guided tissue regeneration (GTR), or the combination of advanced surgical techniques with the utilization of autologous materials rich in growth factors, such as platelet rich fibrin (PRF). The benefits of utilization PRF + OFD in comparison to OFD alone or GTR in comparison to OFD alone have been proved in the literature, and there are successful evidences for regenerating bone and enhancing periodontal tissue healing due to growth factor releasing up to 7 days locally in a surgical site by means of PRF application (8–10).

Therefore, the primary goal of this case series study is to demonstrate the successful effect of PRF in the treatment of periodontal IBDs by using OFD+PRF with a 2-year clinical and radiographic follow-up period.

CASE REPORTS

Case 1

A 24-year-old female patient was presented to the Department of Periodontology, Faculty of Dentistry, Van Yuzuncu Yil University. The patient was complained of tooth pain, sensitivity, and blood taste in her mouth. On examination, the patient had chronic periodontitis (Stage III, Grade B). The tooth #36 presented with plaque, calculus, redness and edema. Periodontal probing revealed a pocket depth of 6 mm, clinical attachment level of 5 mm and the preoperative radiograph showed a radiolucency in the distal root of tooth #36 (Figure 1a).

Before surgical intervention, proper oral hygiene instruction and initial periodontal therapy (SRP with ultrasonic and manual instruments) were performed; the patient signed a written informed consent form. The patient was re-evaluated 4 weeks after completion of the initial treatment to determine their response to previous periodontal therapy and to confirm maintaining oral hygiene procedure properly to prepare for surgical stage.

The surgical stage was initiated by local anaesthesia (4% articaine with 1:1,00000 epinephrine). After the anaesthesia, conventional open flap debridement was applied. A full thickness mucoperiosteal flap was reflected using periosteal elevator at the buccal and lingual sides following sulcular

Sorumlu Yazar: Dt. Anas Alsafadi, e mail: doctoranasalsafadi@gmail.com

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incision. The exposed root surfaces and granulation tissue were thoroughly debrided manually by using gracey curettes. After that the defects were again cleaned by piezoelectric ultrasonic scaler (Tigon, W&H, Austria) to maintain clean strile area. After clean defect was maintained, PRF clot was placed into the bony defect to fill it. At the end of these processes, the flap was closed primarily with tension-free wound closure using the simple interrupted 5-0 prolene suture.

Postoperatively, the patient was instructed to avoid using the operation side during the first week after surgery. The patients also were prescribed non-steroidal anti-inflammatory drug as analgesic and mouthwash containing 0.12 % chlorhexidine gluconate twice a day for 2 weeks for infection control. The sutures were removed in the 2nd week after the operation. After the operation, the patient remained under control for the 2-year follow-up period and were called at intervals for re-evaluation and routine professional cleaning procedures. After 2-year follow-up, the probing depth had reduced from 6 mm to 2 mm, clinical attachment level has become 2 mm and the postoperative radiograph reveals bone fill about 4 mm (Figure 1b).

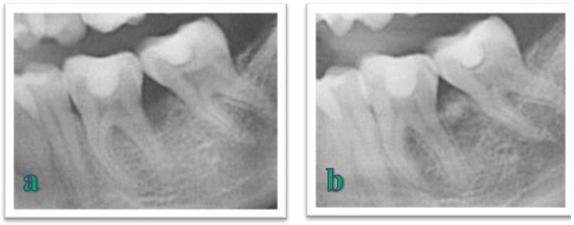

Figure 1. The radiographic x-ray before and after 2-years follow-up of the first case.

Case 2

A 30-year-old female patient was presented to the Department of Periodontology, Faculty of Dentistry, Van Yuzuncu Yil University. The patient was complained of tooth pain, bad breath, and blood comes when tooth brushing. On examination, the patient had advanced chronic periodontitis (Stage IV, Grade B). The tooth #36 presented with plaque, calculus, redness and edema. Periodontal probing showed a pocket depth distally of 12 mm, clinical attachment level of 10 mm and furcation involvement (Grade B vertical lose). The preoperative radiograph showed radiolucency in the distal root of tooth #36 and furcation area (Figure 2a).

Before surgical intervention, proper oral hygiene instruction and initial periodontal therapy (SRP with ultrasonic and manual instruments) were performed; the patient signed a written informed consent form. The patient was re-evaluated 4 weeks after completion of the initial treatment to determine their response to previous periodontal therapy and to confirm maintaining oral hygiene procedure properly for preparation to surgical stage.

The surgical stage was initiated by local anaesthesia (4% articaine with 1:1,00000 epinephrine). After the anaesthesia, conventional open flap debridement was applied. A full thickness flap was reflected using periosteal elevator at the buccal and lingual sides. The root surface and granulation tissue were thoroughly debrided manually by using gracey curettes and cleaned by piezoelectric ultrasonic scaler (Tigon, W&H, Austria) to maintain sterile area. After that, PRF clot was placed into the bony defect. At the end of these processes, the flap was closed primarily with tension-free wound closure using the simple interrupted 5-0 prolene suture.

Postoperatively, patient was instructed the required oral hygiene procedure and prescribed non-steroidal anti-inflammatory drug as analgesic and mouthwash containing 0.12 % chlorhexidine gluconate twice a day for 2 weeks. The sutures were removed in the 2nd week after the operation. After the operation, the patient putted under control for the 2-year follow-up period and were called at intervals for re-evaluation. After 2-year follow-up, the

Sorumlu Yazar: Dt. Anas Alsafadi, e mail: doctoranasalsafadi@gmail.com

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probing depth had reduced from 12 mm to 3 mm, clinical attachment level has become 5 mm and the postoperative radiograph reveals bone fill about 5 mm (Figure 2b).

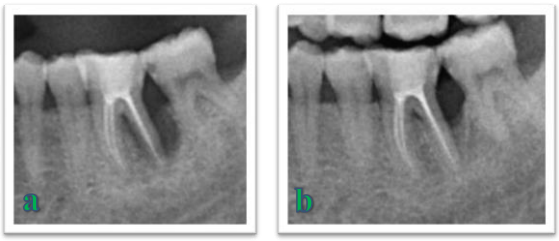

Figure 2. The radiographic x-ray before and after 2-years follow-up of the second case.

Case 3

A 28-year-old female patient was applied to the Department of Periodontology, Faculty of Dentistry, Van Yuzuncu Yil University. The patient was complained of tooth pain, sensitivity and spontaneous oral bleeding. On examination, the patient had advanced chronic periodontitis (Stage III, Grade B). The tooth #46 and #44 presented with plaque, redness and edema. Periodontal probing showed a pocket depth mesially of 8 mm for #46, and distally of 7 mm for #44; clinical attachment level of 10 mm for #46 and 11mm for #44. The preoperative radiograph showed radiolucency in the mesial root of tooth #46 and distal root of #44 (Figure 3a).

Before surgery, oral hygiene instruction and initial periodontal therapy (SRP with ultrasonic and manual instruments) were performed; the patient signed a written informed consent form. The patient was re-evaluated after 4 weeks again to determine their response to periodontal therapy for preparation to surgical phase.

The surgical stage was started by local anaesthesia (4% articaine with 1:1,00000 epinephrine). After the anaesthesia, conventional open flap debridement was applied. A full thickness flap was reflected using periosteal elevator at the buccal and lingual sides. The root surface and granulation tissue were thoroughly debrided manually by using gracey curettes then cleaned again by piezoelectric ultrasonic scaler (Tigon, W&H, Austria). After that, PRF clot was placed into the bony defect carefully. At the end of these processes, the flap was closed primarily with tension-free wound closure using the simple interrupted 5-0 prolene suture.

Postoperatively, the patient was given essential oral hygiene instruction and prescribed non-steroidal anti-inflammatory drug as analgesic and mouthwash containing 0.12 % chlorhexidine gluconate twice a day for 2 weeks. The sutures were removed in the 2nd week after the operation. After the operation, the patient remained under control for the 2-year follow-up period and were called at intervals for re-evaluation and routine cleaning procedures. After 2-year follow-up, the probing depth had reduced from 8 mm to 1 mm for #46 and from 7 mm to 2 mm for #44; clinical attachment level has become 5 mm for #46 and #44; the postoperative radiograph reveals bone fill about 3 mm for #46 and 4 mm for #44 (Figure 3b).

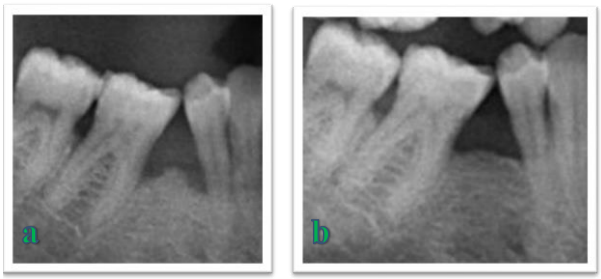

Figure 3. The radiographic x-ray before and after 2-years follow-up of the third case.

DISCUSSION

The goal of periodontal treatment is to treat and prevent the periodontal infection and restoring the damaged periodontal tissue. The therapeutic effectiveness of PRF in the treatment of IBDs in patients with periodontitis is evaluated in this case series. In this study, PRF clot was used rather than PRF membrane in the IBDs treatment to get the maximum

Sorumlu Yazar: Dt. Anas Alsafadi, e mail: doctoranasalsafadi@gmail.com

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amount of the growth factors found in the PRF. The outcomes of this study were a remarkable improvement in clinical parameters and radiographic bone fill. There was a reduction in pocket depth and improvement in clinical attachment level after 2 years post-surgery.

Periodontal regeneration procedures can be performed by application of OFD in combination to using some biological materials including enamel matrix derivative (Emdogain), or autologous products (Autologous platelet concentrate and autogenous bone graft). Recently, Emdogain (EMD) is one of the frequently used regenerative materials that can be utilized in the surgical treatment of periodontal intrabony defects in combination with open flap debridement (OFD) procedure and has shown comparable results with GTR technique (11–14). When compared to OFD alone, the addition of Emdogain to OFD results in a much higher clinical attachment gain (21, 22). However, more study is needed about EMD because the evidence regarding the various techniques is contradictory. The using of EMD combined with bone grafts may lead to further clinical advantages in terms of CAL gain and PD reduction in comparison to application of EMD alone.

Recently, autologous platelet concentrate have been demonstrated to improve soft tissue healing, and can aid to promote bone formation indirectly (15). Platelet concentrate can be used as a regenerative material because it contains cytokines and growth factors that can promote bone regeneration and soft-tissue healing. PRF does not dissolve quickly at the surgical site after using due to the strong fibrin matrix which is remodelled slowly in a similar way to a natural blood coagulation (16). The findings show that both advanced platelet-rich fibrin (A-PRF) and concentrated growth factors (CGF) have large amounts of growth factors able to induce cell proliferation that aids in soft tissue healing and bone reconstruction. Platelet concentrate is not only a scaffolding material but also as a reservoir for delivering several types of growth factors to the operated area (17). According to Ajwani et al., the addition of PRF to OFD led to substantial improvements in clinical indices and radiographic results (bone fill) when compared to OFD alone (10). PRF accelerates the recovery of bony defects whether administered alone or in conjunction with autogenous bone grafts, according to histomorphometrical analyses. According to Kökdere et al. in the treatment of intraboy defects, PRF alone and autogenous graft with PRF had statistically significant improvement in osteoblasts and new bone formation (18). Also, PRF considerably improves clinical and radiographic results in the treatment of IBDs by using guided tissue regeneration as compare to OFD alone (19). In the study of Pradeep et al., intrabony defects were treated by using PRF or PRP with conventional OFD, which conclude that PRF may appear to be the superior of the two because it takes less time and is less technique sensitive (20).

CONCLUSION

This case series study concludes that the addition of PRF to OFD is highly predictable in treatment of periodontal intrabony defects and resulted in a remarkable improvement in clinical parameters and radiographic outcomes (bone fill increasing) after 2-years follow-up. However, further studies can give more detailed information.

Sorumlu Yazar: Dt. Anas Alsafadi, e mail: doctoranasalsafadi@gmail.com

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