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A Contemporary Approach: Presentation of 4 Cases with the Entire Papilla Preservation (EPP) Technique

Şükran ACIPINAR[1*] Taha Yasin ERDOĞAN[2]

[1] Ass. Prof., Department of Periodontology, Faculty of Dentistry, Sivas Cumhuriyet University, Sivas, Türkiye, sukranacipinar@cumhuriyet.edu.tr

[2] Res. Ass., Department of Periodontology, Faculty of Dentistry, Sivas Cumhuriyet University, Sivas, Türkiye, tyasinerdogan93@gmail.com

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ABSTRACT

Regeneration of periodontal tissue is a primary goal of periodontal treatment. Periodontal regeneration approaches are widely used in the treatment of intraosseous defects. However, the success of these techniques depends on many factors, including surgical considerations. Failures in wound closure in the interdental region, which are surgical factors, have led to the development of papilla preservation techniques. The entire papilla preservation technique (EPP) maintains the integrity of the papilla associated with the defect. This technique stabilizes the blood clot with intact gingiva, preventing wound exposure and contamination.

EPP is performed in intra-osseous defects through a short buccal vertical incision, without incising the papilla of the involved tooth. A full-thickness buccal flap is lifted from the incision to the relevant papilla and a tunnel extending under the papilla is prepared. The papilla is also lifted to full thickness. The defect is cleaned of granulation tissue and the wound is closed primarily with or without biomaterial application. In this report, we present 4 cases, 3 in the anterior maxilla and 1 in the mandibular premolar region, undergoing periodontal surgery with EPP with biomaterial application with a 3-month follow-up. In all cases, soft tissue healing was uncomplicated and radiographs showed bone filling at 3 months.

EPP has a high success rate in periodontal regeneration by providing complete nutrition of the interdental papilla through natural, continuous vascular support in intraosseous defects.

Güncel Bir Yaklaşım Olarak Papillanın Tamamının Korunması Tekniği İle 4 Olgu Sunumu

Makale Bilgisi

Makale Geçmişi

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İnterdental papilla.

ÖZET

Periodontal dokunun rejenerasyonu periodontal tedavinin temel hedeflerinden biridir. Kemik içi defektlerin tedavisinde periodontal rejenerasyon teknikleri yaygın olarak kullanılmaktadır. Ancak teknikler yüksek hassasiyet gerektirir ve başarı birçok faktöre bağlıdır. Hastaya ve defektlere bağlı faktörlerin yanında cerrahiye bağlı faktörler de sonuçlar üzerinde önemli bir etkiye sahiptir. Cerrahi faktörler arasında interdental bölgede primer yara kapanmasındaki başarısızlıklar papilla koruma tekniklerinin gelişimine neden olmuştur. Papillanın tamamının korunması tekniği (PTK), defektle ilişkili papillanın bütünlüğünü korumak için önerilmiştir. Bu teknik, kan pıhtısını stabilize etmek için sağlam bir diş eti sağlamakta, bölgeyi kontaminasyondan korumakta ve yara ekspozunu önlemektedir.

PTK, kemik içi defektlerde, ilgili dişin papilla insizyonu olmadan, mukogingival hattının hemen ötesine uzanan kısa bir bukkal vertikal serbestleştirici insizyonla uygulanır. İnsizyondan ilgili papillaya kadar tam kalınlıkta bukkal flep kaldırılır ve papillanın altına uzanan tünel hazırlanır. Papilla da tam kalınlıkta olacak şekilde kaldırılır. Kemik içi defekt granülasyon dokularından temizlenir ve biyomateryal uygulanarak veya uygulanmaksızın yara primer olarak kapatılır. Bu raporda, 3'ü maksilla anterior bölgede, 1'i mandibular premolar bölgede olmak üzere, biyomateryal uygulanarak PTK ile periodontal cerrahi gerçekleştirilen 4 adet olgu ve 3 aylık takipleri sunulmaktadır. Olguların tümünde klinik olarak yumuşak doku yara iyileşmesi komplikasyonsuzdur. Hastaların takip radyografilerinde 3 aylık dönemde kemik dolumları izlenmektedir. PTK, kemik içi defektlerde interdental papillanın, doğal kesintisiz damar desteğiyle tamamen beslenmesini sağlayarak, periodontal rejenerasyonda yüksek başarı oranına sahiptir.

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***Corresponding Author:** Şükran ACIPINAR, *sukranacipinar@cumhuriyet.edu.tr*

INTRODUCTION

Regeneration of periodontal tissue is one of the primary goals of periodontal treatment. Numerous surgical techniques and biomaterials have been employed for periodontal tissue regeneration.[1,2] However, these techniques require meticulous study, and the outcomes of regenerative therapy are influenced by various factors, including the specific case, the nature of the defect and the surgical procedure itself.[3,4] Surgical factors, such as the impact of the interdental papilla incision on wound healing, play a significant role. Impaired wound healing due to the incision of the interdental papilla can result in inadequate protection of the area from the intraoral environment and exposure to biomaterials. This exposure is a common complication that can lead to contamination of the surgical field, adversely affecting the outcome.[5]

To overcome these shortcomings, alternative approaches have been proposed, including minimally invasive flap design, microsurgery, and the use of Emdogain, which alter both surgical methodology and the application of materials.[5] The objective of these approaches is to create an optimal environment for the wound to heal smoothly and stably, thereby facilitating primary closure.

Surgical approaches, such as the papilla preservation technique,[6] have demonstrably increased the clinical success rate in periodontal surgery. However, these techniques involve the incision of interdental papillae, even in limited areas, and the suturing of the papilla has been shown to have a local adverse effect on blood circulation, causing papillary atrophy.[7]

In 2017, a new surgical approach, the 'entire papilla preservation (EPP) technique', was proposed for the regenerative periodontal treatment of isolated deep intraosseous defects.[8] EPP represents a contemporary, conservative surgical approach that provides adequate access to isolated interproximal intraosseous defects for debridement, while preserving the vascular and anatomical integrity of the interdental papilla associated with the defect. This preservation allows for the creation of an intact gingival environment over the intraosseous defect, facilitating the preservation of the delicate biological regeneration process and stabilizing the clot.

The EPP technique involves making a single releasing vertical incision on the buccal side, contralateral to the defect. This incision crosses the mucogingival junction by 1-2 mm, ensuring the preservation of the integrity of the papilla in a tunnel-like manner. The incision line is situated in a safe area of the natural bone, distant from the bone defect. A full-thickness flap extending from the incision to the defect is elevated, and a tunnel is prepared under the papilla.

The granulation tissues are removed and irrigated with a sterile saline solution. The area is then sutured, either with or without the application of a biomaterial. The healing potential of a properly sutured incision is considerable, and uncomplicated wound healing at the incision line has been widely reported.[5] The absence of an incision in the papilla provides an intact gingival environment to stabilize the blood clot, and promote healing, eliminating the need for any sutures in the papilla. This technique ensures that the papilla is fully nourished with a natural, uninterrupted vascular supply, thereby preventing exposure of the wound or biomaterial.

In light of the aforementioned information, this report presents four cases of periodontal surgery with EPP, three in the anterior maxilla and one in the mandibular premolar region, along with their 3-month follow-ups.

CASE REPORTS

Case 1

A 23-year-old male patient presented to our clinic for the removal of calculus. The patient's medical history indicated that he had previously undergone orthodontic treatment. A clinical examination revealed the presence of an 11 mm periodontal pocket depth on the mesial aspect of tooth number 21. A radiographic and clinical evaluation revealed that tooth number 21 exhibited an intra-osseous periodontal defect. Phase 1 periodontal treatment was initiated. At the follow-up visit six weeks later, it was determined that the pocket depth of the relevant tooth had regressed to 9 mm and bleeding on probing and suppuration findings continued. The patient was therefore taken to phase 2 periodontal treatment with the application of EPP. During the surgical procedure, the area of the intra-bony defect was accessed through a vertical incision on the adjacent lateral aspect of the papilla (Figure 1). The granulation tissues were then cleaned and irrigation with a sterile saline solution. A synthetic bone graft material was placed in the defect, and the defect was covered with platelet-rich fibrin (PRF) obtained from the patient's venous blood at 2800 rpm for 12 minutes. The flap was then sutured with a 6.0 polypropylene suture. The patient was prescribed postoperative antibiotics, analgesics, and a mouthwash. Two weeks later, the sutures were removed, and the patient did not report any complaints regarding his postoperative condition. At the 90-day follow-up, a clinical evaluation revealed the absence of bleeding on probing and suppuration, and a radiographic examination confirmed the presence of bone filling in the intraosseous defect (Figure 2).

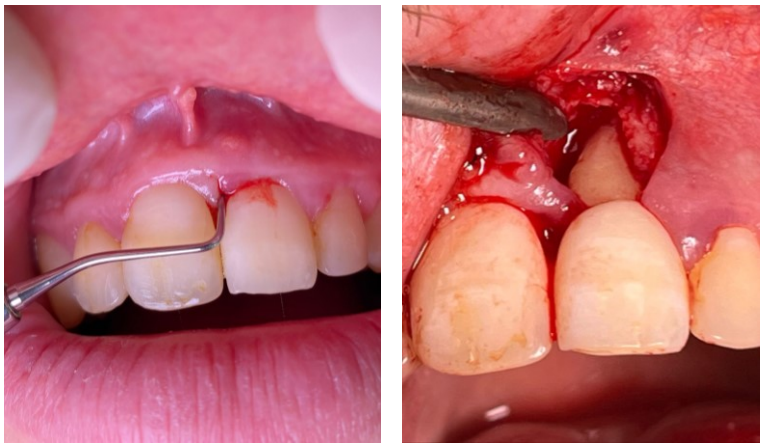

Figure 1: Preoperative probing depth at the distal side of the maxillary left central incisor (left), the entire papilla preservation (EPP) technique (right).

Figure 2: Baseline (left) and 3 mouth periapical radiograph (mid) and 3 month follow-up intraoral appearance (right).

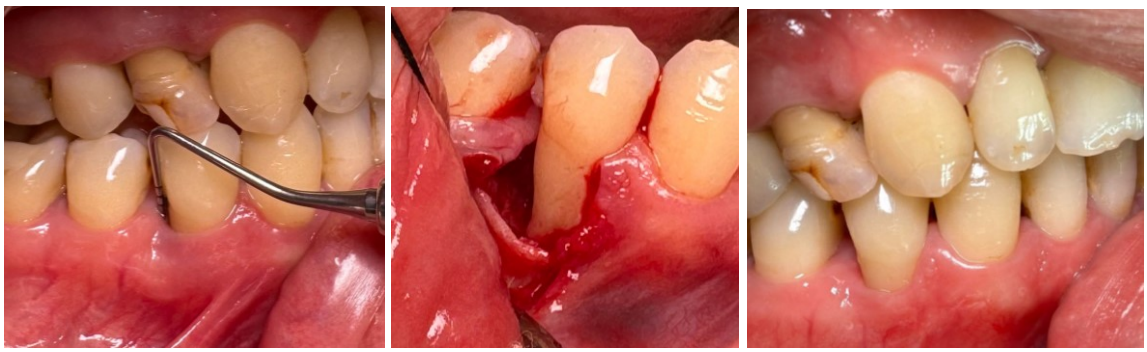

Figure 3: Ten mm preoperative probing depth at the distal side of the mandibular right premolar(left), intraoperative apperance(mid) and intraoral appearance at 3 months (right).

Case 2

A 41-year-old male patient presented to our clinic for the removal calculus. A review of the patient's medical history revealed no evidence of systemic disease. A clinical evaluation revealed the presence of a periodontal pocket, measuring 10 mm in depth, distal to tooth number 44 (Figure 3). A radiographic and clinical evaluation revealed that tooth number 44 exhibited an intraosseous periodontal defect. The patient was subjected to phase 1 periodontal treatment, and subsequent re-evaluation demonstrated a reduction in pocket depth by 1 mm, resulting in a total depth of 9 mm. At this stage, the patient underwent phase 2 periodontal treatment, which included EPP. During the surgical procedure, the intraosseous defect was cleaned of granulation tissues and irrigated with a sterile saline solution. A demineralized freeze-dried bone allograft was then placed into the defect. The flap was then sutured with a 5.0 silk suture. Following the procedure, the patient was prescribed antibiotics, analgesics, and mouthwash. Two weeks later, the sutures were removed, and the patient did not report any complaints regarding his postoperative condition. At the 90-day follow-up, there was an improvement in the clinical periodontal parameters, with no evidence of bleeding or suppuration on probing. Furthermore, the radiographic examination confirmed the presence of bone filling in the intraosseous defect (Figure 4).

Figure 4: Baseline radiograph (left) and 3. month periapical radiograph shows bone filling (right).

Case 3

A 61-year-old male patient presented to our clinic for the removal of calculus. In the anamnesis, it was established that the patient did not have any systemic disease. A clinical

evaluation revealed the presence of a 7 mm periodontal pocket depth in the mesial aspect of tooth number 11 in the buccal tipping position. A radiographic and clinical evaluation revealed the presence of an intraosseous periodontal defect in tooth number 11. Phase 1 periodontal treatment was initiated. Following a six-week healing period, EPP was applied to the relevant tooth as part of Phase 2 periodontal treatment, given that there was no reduction in pocket depth. During the surgical procedure, the intraosseous defect was cleaned of granulation tissues and irrigated with a sterile saline solution. A demineralized freeze-dried bone allograft was placed into the defect. The defect was subsequently covered with platelet-rich fibrin (PRF). The flap was then sutured with a 6.0 polypropylene suture. (Figure 5). Following the procedure, the patient was prescribed antibiotics, analgesics, and mouthwash. On the 14th day, the sutures were removed, and the patient did not report any postoperative complaints. At the 90-day follow-up, improvements in clinical periodontal parameters such as bleeding on probing were observed, and a radiographic examination confirmed bone fill in the intraosseous defect. (Figure 6)

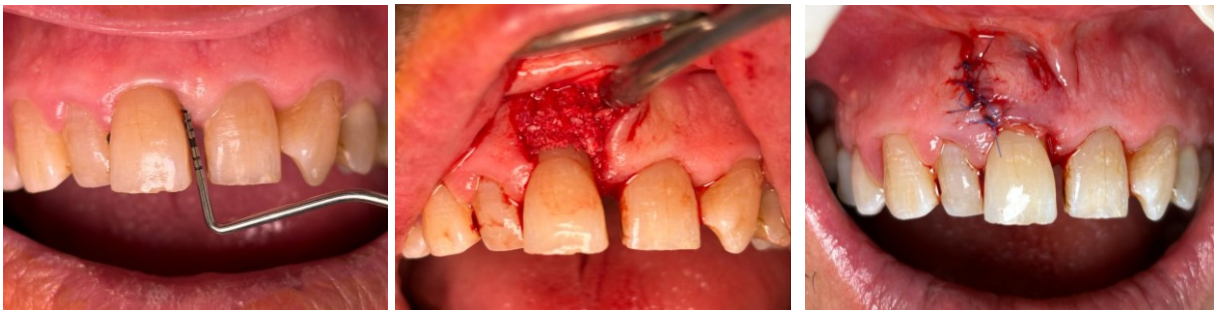

Figure 5: Measurement of pocket depth of tooth number 11 before EPP (left), appearance with graft placed during surgery (mid) and intraoral apperearance at 2 weeks after surgery (right).

Case 4

A 32-year-old female patient presented to our clinic with a complaint of pain in her anterior teeth. A review of the patient's medical history revealed no evidence of underlying systemic disease. A periodontal pocket depth of 10 mm was observed in the mesial aspect of tooth number 11 during the clinical examination. A radiographic and clinical evaluation revealed that tooth number 11 had an intra-osseous periodontal defect. The patient was subjected to phase 1 periodontal treatment. Following the healing period, it was established that the pocket depth had decreased to 8 mm, the presence of suppuration was detected and EPP was subsequently applied to the relevant tooth within the context of phase 2 periodontal treatment. During the surgical procedure, the intraosseous defect was cleaned of granulation tissues and irrigated with a sterile saline solution. A demineralized freeze-dried bone allograft was then placed into the defect. The defect was subsequently covered with a collagen membrane and PRF, which was obtained from the patient's venous blood. The flap was then sutured with a 6.0 polypropylene suture. (Figure 7) Following the procedure, the patient was prescribed antibiotics, analgesics and a mouthwash. On the 10th day, the sutures were removed, and the patient did not report any postoperative complaints. At the three-month follow-up, clinical evaluation demonstrated that the incision line healed uneventfully, there was no bleeding or suppuration on probing, and a radiographic examination revealed that the defect had been filled with bone (Figure 8).

Figure 6: Baseline radiograph (left) and 3. month periapical radiograph shows bone filling (right).

Figure 7: Baseline intraoral apperearance (left), graft (mid) and membrane application(right) in right maxillary central incisor treated with the entire papilla preservation technique.

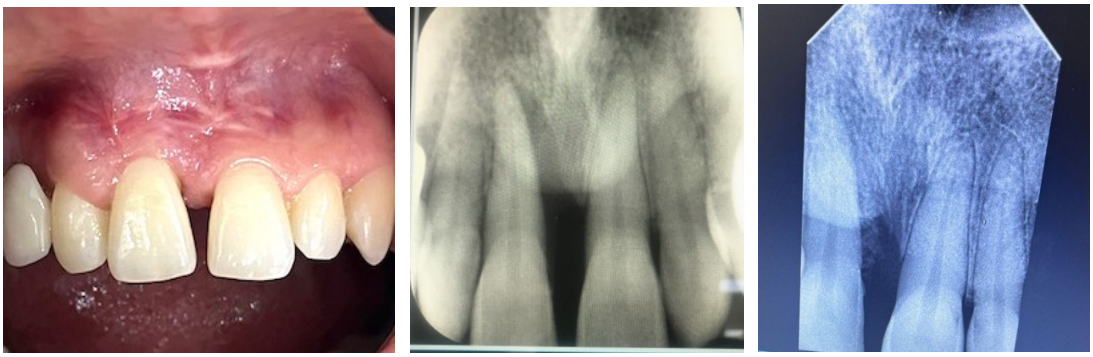

Figure 8: Intraoral appearance at 3 months (left), baseline radiograph (mid) and 3. month periapical radiograph shows bone filling (right).

DISCUSSION

The success of periodontal regeneration techniques depends on a number of factors, with each step, including incision design, flap shape, debridement methods, material positioning, flap repositioning and suturing-playing a role in the final outcome.[9] The primary closure of the interdental space serves to protect the wound site from the intraoral environment and reduce microbial infection. In conventional periodontal flap surgery, an incision is employed to separate the interdental papilla.[10] This incision allows full access to the defect but increases the risk of flap separation and biomaterial exposure, which are the main short-term postoperative complications during the early soft tissue healing phase. These complications can lead to bacterial contamination and, consequently, periodontal regeneration failure.[9]

Several techniques have been proposed to

reduce the risk of complications during the early stages of wound healing.[5] These approaches involve the preservation of the interdental papilla through minimally invasive surgical techniques. However, despite these techniques, an incision is still required to access the papilla, which may lead to papillary atrophy.[7] To achieve more optimal results, the EPP technique has been proposed, which preserves the integrity of the entire papilla associated with the defect through a tunnel-like incision.[8] This technique allows for the performance of regenerative treatment with a vertical incision away from the bone defect, thereby avoiding an incision in the interdental papilla, reducing the risk of papillary rupture. The EPP technique ensures the maintenance of an intact gingival chamber, thereby enabling clinical outcomes comparable to those achieved through conventional treatment, while reducing the incidence of aesthetic complications. The EPP technique does not involve the dissection of supra crestal fibers in the interdental tissues, thus maintaining the papilla in its coronal position. This technique helps to preserve the underlying cavity and stabilize the blood clot and interproximal soft tissues.[5]

In EPP, the defect can only be accessed from the buccal side, which may limit its clinical applicability. Extensive involvement of the palatal and lingual sides of the tooth renders this approach unsuitable, as access to the palatal part of the defect is severely limited. The primary indication for EPP is a two-walled intraosseous defect with a missing buccal bone wall and a relatively well-preserved lingual wall.[5] All cases in the case series exhibited a deficient buccal wall. This case selection is consistent with another study in which EPP was performed in two-walled defects, with the majority of defects in both groups being essentially non-supportive. The successful results support the hypothesis that EPP improves soft tissue and wound stability in this study.[5]

In the case series, graft material was employed in all cases, with the addition of PRF in two cases and PRF and a collagen membrane in one case. The selection of biomaterial did not result in any discernible clinical differences in the healing process. These results are consistent with the results of a study in which bone grafts and soft tissue grafts such as CTG were applied, and non-absorbable membranes were not required.[9]

In the case series of the present study, all incisions healed uneventfully. Minimal gingival recession was observed in the buccal region, with no loss of interdental papilla. The average gingival recession in all cases was 0.62 mm (min:0.2 mm max:1.2 mm). These results are in accordance with the findings of a 12-case study which reported that the early healing process was uneventful in all cases and that 100% primary wound closure was achieved within one year.[11] Furthermore, the study demonstrated that EPP led to significant results with a negligible increase in gingival recession. The minimal increase in gingival recession was associated with a decrease in probing depth, suggesting that gingival recession may be explained by the shrinkage of marginal soft tissues during secondary wound healing.

CONCLUSION

The ‘EPP’ technique, characterized by a tunnel-like configuration, can prevent the exposure of regenerative biomaterials, enhance the stabilization of the blood clot in deep intraosseous defects, and facilitate the achievement of optimal clinical outcomes.

Ethical Approval

This in-vitro study does not require ethics committee approval.

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The authors declare that this study received no financial support.

Conflict of Interest

The authors deny any conflicts of interest related to this study.

Author Contributions

Design: ŞA, TYE, Data collection or data entry: ŞA, TYE, Analysis and interpretation: ŞA, Literature review: ŞA, Writing: ŞA.

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