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Treatment of intrabony defects with the entire papilla preservation technique

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Abstract

Background: The "Entire Papilla Preservation (EPP)" technique has been proposed to treat isolated deep intrabony defects with periodontal regeneration. The general idea behind this concept is to preserve the integrity of the papilla associated with the defect by providing a tunnel-like incision. The fully preserved interdental papilla provides an area surrounded by gingiva to stabilize the blood clot and improve the wound healing process. In this case series, the treatment of intrabony defects with the EPP technique is presented.

Materials & methods: The presence of an intrabony defect was detected in the clinical and radiographic examination of 3 systemically healthy patients who applied to the periodontology clinic for gum treatment. After the Phase 1 periodontal treatment of the patients was completed, the defect areas were reached with the EPP technique, which was made by making a vertical and sulcular incision from the buccal side of the relevant tooth, under local anesthesia. After the granulation tissues were cleaned, the defect areas were treated with bone grafting depending on the width of the defect areas. The vertical incision area was closed primarily by suturing with 5/0 nylon. Postoperatively, antibiotics, analgesics and antiseptic mouthwash were prescribed to the patients. No complications were encountered during the recovery period.

Results: After 6 months of follow-up, probing depth decreased in all cases. There was no change in the amount of gingival recession, and bleeding on probing was considered negative. Full mouth plaque and bleeding scores were recalculated and a decrease was observed.

Conclusion: In our cases, the EPP technique resulted in 100% closure of the defect area throughout the entire healing period. In line with the findings of this case series, it is thought that the EPP method, in which clot and flap stability is preserved, increases the success in the treatment of intrabony defects.

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Introduction

Treatment of intrabony defects requires careful planning of the roots and complete surgical removal of all granulation tissue between the root of the tooth and the bone [1]. Over the past century, traditional flap surgeries have been used to treat advanced cases of periodontitis, using large flaps to provide access to underlying diseased tissues. However, studies have shown that the use of large flaps causes many postoperative failures such as interdental papillary gingival loss, loss of gingival cleanliness and contour, tooth sensitivity, and crestal bone resorption. These changes were considered as inevitable sequelae of surgical intervention. Excessive flap design can lead to increased operative development, extensive tissue manipulation, increased pain, swelling, and swelling following surgery and delayed healing. With the developing and unsuccessful technology, minimally invasive surgical treatments are brought to the agenda to reduce or eliminate this complication in stroke surgeries [2]. Significant advances in flap design and soft tissue management have been observed [3]. The adoption of surgical methods such as papilla preservation technology [4] has by far increased the clinical success in periodontal surgery. The adoption of microsurgery has paved the way for minimally invasive surgical methods with papilla elevation [5] or without palatal papilla elevation [6,7].

In recent years, there has been a trend towards surgical reconstruction of the lost periodontium and minimally invasive treatment concepts to limit morbidity and increase the primary healing rate [6,8]. On this path of evolution, researchers have focused on the impact of biomaterials and innovations in flap designs. Histological studies have shown that periodontal regeneration can be achieved with various biomaterials, including space-making materials and biological factors [1,9]. Clinicians and researchers have shown a clear tendency to prefer biological factors with or without bone grafting instead of using the Guided Bone Regeneration (GBR) technique [10,11]. The use of biomaterials to "fill" a defect rather than membranes to "cover" a defect has facilitated the development of new flap designs, ushering in the era of "minimally invasive surgery" and "microsurgery" [2,6,12,13]. In 2017, Aslan et al. proposed the "Entire Papilla Preservation (EPP)" technique, a new surgical technique in reconstructive periodontal surgery of deep intraosseous defects [7,14]. In this technique, a single vertical incision is made on the contralateral side of the intrabony defect for convenient access and avoidance of any incision on the papilla associated with the defect is intended. Elimination of the incision in the interdental papilla associated with the defect minimized tissue trauma due to manipulation, prevented disruption of blood supply, and resulted in better stabilization of the blood clot [2]. It has been argued that a completely preserved interdental papilla over the intrabony defect provides optimal healing conditions in this technique [1]. EPP is a flap procedure that requires competence and surgical skill. EPP application is indicated for isolated interproximal intrabony defects. Extensive involvement of the palatal side of the tooth makes this approach impractical. A 2-walled intraosseous bone with a missing buccal bone wall and a relatively well-preserved lingual bone wall is the best indication for EPP. On the contrary, multiple intrabony defects or single-wall intrabony defects are not indicated for the application of this new surgical technique [7]. There are only a few studies in the literature addressing the treatment of intrabony defects with this technique. In this case series, the treatment of 3 patients with intrabony defects with the EPP technique is presented.

Material and methods

A total of 3 cases, 2 female and 1 male patient, without systemic disease, non-smokers, were reported: the age range was 32 to 50. All had advanced periodontal disease that was nonsurgical and adhered to a periodontal maintenance phase of ≥12 months. All patients signed informed consent after receiving a complete description of the periodontal surgical procedure, in full compliance with the guidelines of the World Medical Association Declaration of Helsinki and the revision of the 2013 Good Clinical Practice Guidelines. Each patient had soft tissue recession and deep intrabony defects. The morphology of each defect was confirmed intrasurgically. The right and left upper lateral incisors and the lower left molar were treated. Clinical periodontal parameters were recorded at baseline and 6 months after reconstructive surgery. Clinical periodontal parameters were measured from four regions (mesial, buccal, distal and lingual) of all teeth except the third molars. Baseline and 6-month clinical measurements were performed by the same investigator. Relevant measurements are shown in Table 1.

Before the study, the examiner was calibrated for repeatability and accuracy. Full-Mouth Plaque Scores (FMPS) were recorded as the percentage of total surfaces exposing plaque. Probing bleeding (BOP) was evaluated dichotomously (as present or absent), and BOP was considered positive if it occurred within 15 seconds of probing. Then, Full Mouth Bleeding Scores (FMBS) were calculated. Clinical Attachment Loss (CAL) was calculated as the sum of gingival recession (REC) and probing depth. Postoperatively, wound closure of the surgical sites was evaluated. Adverse effects such as hematoma, pain, discomfort, edema, and additional painkiller intake were recorded.

This case series has been reported in line with the PROCESS Guideline [18].

Cases

Case 1

An intrabony defect was detected in the radiographic examination of a 44-year-old systemically healthy male patient, who came to our clinic due to mobility in tooth number 22 and deviation between the teeth over time (Figure 1A,B). Clinical examination revealed class 2 mobility, occlusal trauma, 8 mm probing depth, 4 mm gingival recession and 12 mm clinical attachment loss. Full Mouth Plaque Score (FMPS) was calculated as 21.6 and full mouth bleeding score was calculated as 33.95 (Figure 1C). To prevent occlusal trauma, the tooth was dropped from occlusion and temporarily splinted. In the controls performed after Phase 1 periodontal treatment, it was seen that the pathological pocket in the relevant tooth had not healed and a surgical planning decision was made.

The surgical area was anesthetized using articaine-epinephrine: 100,000. Transpapillary infiltration was avoided to avoid physical needle penetration of the gingiva and trauma due to chemical prolonged vasoconstriction. Following the buccal sulcular incision, an inclined vertical release incision was made in the buccal gingiva of the adjacent interdental space, and the vertical incision was extended just beyond the mucogingival line to provide appropriate access to the intrabony defect. A specially designed angled tunnel elevator facilitated interdental tunnel preparation under the papillary tissue. Care was taken to elevate the interdental papilla to its full thickness, up to the lingual level. The depth of the intrabony defect was measured as 7

mm (Figure 1D). Granulation tissue was dissected and removed from the inner part of the interdental papilla using microsurgical scissors. Granulation tissue remaining in the intrabony defect was eliminated with mini curettes. Then, a tent screw was placed and the apical and middle parts of the intrabony defect were filled with dental allograft (Figure 1E). Resorbable collagen membrane was applied on the graft (Figure 1F). For primary wound closure of a single vertical incision, sutures were placed using 5-0 monofilament suture materials (Figure 1G,H).

Postoperative periapical x-ray was taken (Figure 1I). After surgery, the patient was given 500 mg flurbiprofen twice a day for 3 days. To control bacterial contamination, systemic amoxicillin was prescribed. The patient was asked to refrain from using mechanical oral hygiene measures for 2 weeks after surgery. During this time, a 0.12% chlorhexidine digluconate mouthwash was prescribed twice daily. The patient was called for postoperative 1st week and 2nd week controls (Figure 1J,K). Sutures were removed 2 weeks after surgery. During the healing period, primary wound healing of the vertical releasing incision, integrity of the interdental papilla, and 100% primary wound closure were observed. No adverse events were recorded. As a result of the 6-month follow-up, it was observed that there was a 5 mm decrease in the probing depth in the relevant tooth and a 3 mm probing depth (Figure 1L,M). While there was no change in the amount of gingival recession, bleeding on probing was evaluated as negative. Full mouth plaque and bleeding scores were recalculated and a decrease was observed (FMPS 18.51; FMBS 23.45).

Case 2

In the radiographic examination of a 32-year-old systemically healthy female patient who came to our clinic due to gingival bleeding, bone loss was detected in the distal part of tooth number 36 (Figure 2A,B). During clinical examination, a pathological pocket was found and an intrabony defect was detected along with the periapical tissue taken (Figure 2C). Clinical examination revealed a probing depth of 7 mm and a bleeding groove on probing. No gingival recession was observed. Clinical attachment loss was measured as 7 mm. FMPS and FMBS measurements were calculated as 16.66 and 20.98, respectively.

Phase 1 periodontal treatment was applied. As the pathological pocket did not heal, a decision was made to plan surgery. EPP technique was applied under local anesthesia. After the granulation tissues were removed, dental allograft was applied (Figure 2D). Suturing was performed with 5/0 nylon (Figure 2E). After surgery, the patient was given 500 mg of flurbiprofen twice a day for 3 days. To control bacterial contamination, systemic amoxicillin was prescribed. The patient was asked to refrain from using mechanical oral hygiene measures for 2 weeks after surgery. During this time, a 0.12% chlorhexidine digluconate mouthwash was prescribed twice daily. Postoperative 1st week and 2nd week controls were performed (Figure 2F,G). As a result of the 6-month follow-up, it was observed that there was a 3 mm drilling depth in the relevant tooth, with a 4 mm decrease in the drilling depth (Figure 2H-I). Bleeding on probing was evaluated as negative. Whole mouth plaque and bleeding scores were recalculated and a decrease was observed (FMPS: 16.04; FMBS: 17.09).

Case 3

In the radiographic examination of a 50-year-old systemically healthy female patient who came to our clinic due to gingival bleeding, an intrabony defect was detected in the distal part of tooth No. 12 (Figure 3A,B). Clinical examination revealed 6 mm probing depth, bleeding on probing, and 6 mm attachment loss. (Figure 3C). Clinical attachment loss was measured as 6 mm. FMPS and FMBS measurements were calculated as 30.86 and 21.86, respectively.

Phase 1 periodontal treatment was applied. As the pathological pocket did not heal, a decision was made to plan surgery. EPP technique was applied under local anesthesia. The intraosseous defect depth was measured as 5 mm. After the granulation tissues were removed, PRF was applied (Figure 3D). Suturing was performed with 5/0 nylon (Figure 3E). After surgery, the patient was given 500 mg of flurbiprofen twice a day for 3 days. To control bacterial contamination, systemic amoxicillin was prescribed. The patient was asked to refrain from using mechanical oral hygiene measures for 2 weeks after surgery. During this time, a 0.12% chlorhexidine digluconate mouthwash was prescribed twice daily. Postoperative 1st week and 2nd week controls were performed (Figure 3F,G). As a result of the 6-month follow-up, it was observed that there was a 3 mm drilling depth in the relevant tooth, with a 4 mm decrease in the drilling depth (Figure 3H,I). Bleeding on probing was evaluated as negative. Whole mouth plaque and bleeding scores were recalculated and a decrease was observed (FMPS: 14.81; FMBS: 8.4).

Results

Primary wound healing of the vertical releasing incision, integrity of the interdental papilla, and 100% primary wound closure were observed throughout the healing period in all cases. No adverse events were recorded. After 6 months of follow-up, probing depth decreased in all cases. There was no change in the amount of gingival recession, and bleeding on probing was considered negative. Full mouth plaque and bleeding scores were recalculated and a decrease was observed.

Discussion

Primary wound closure and uneventful early wound stability on biomaterials are the most critical elements of successful periodontal regeneration. However, surgical elevation of the interdental papilla to reach deep and wide intrabony defects causes disruption of papillary blood flow, which may lead to difficult healing due to failure to achieve primary closure in the early healing period [14]. This adverse event may facilitate bacterial contamination, complicating the healing process. EPP provides the most suitable environment for wound healing in regenerative procedures. The fully preserved interdental papilla provides an intact gingival-surrounded area to stabilize the blood clot and improve the wound healing process [14].

Published data report 100% primary closure during wound healing stages when TPC is applied with amelogenins and bone-like materials [7,14]. This rate of primary closure may be explained, at least in part, by the integrity of the vascular supply and the “complete” preservation of the interdental papilla associated with the defect. Additionally, the use of amelogenins can also improve the quality of healing [15-17]. In a study by Pierpolo Cortellini et al. in 2020, the EPP technique was applied with enamel matrix derivatives and bone graft, and the application of the EPP technique with or without regenerative biomaterials resulted in a significant gain in clinical attachment loss and increased probing depth, with a negligible increase in gingival recession. resulted in a decrease. Within the results of this study, it can be concluded that the addition of regenerative

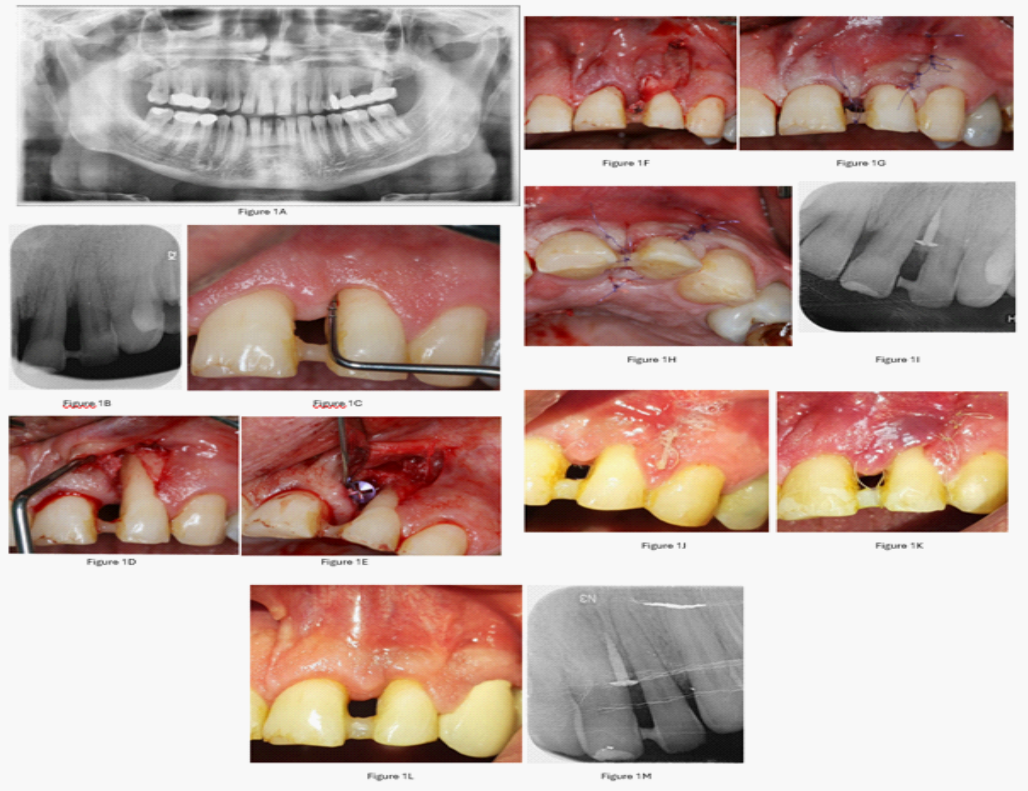

Figure 1: An intrabony defect was detected in the radiographic examination of a 44-year-old systemically health male patient, who came to our clinic due to mobility in tooth number 22 and deviation between the teeth over time **(1A,B)**. Full Mouth Plaque Score (FMPS) was calculated as 21.6 and full mouth bleeding score wascalculated as 33.95 **(1C)**. The depth of the intrab only defect was measured as 7 mm **(1D)**. Granulation tissue was dissected and removed from the inner part of the interdental papilla using microsurgical scissors. Granulation tissue remaining in the intrabony defect was eliminated with mini curettes. Then, a tent screw was placed and the apical and middle parts of the intrabony defect were filled with dental allograft **(1E)**.Resorbable collagen membrane was applied on the graft **(1F)**. For primary wound closure of a single vertical incision, sutures were placed using 5-0 monofilament suture materials **(1G,H)**. Postoperative periapical x-ray was taken **(1I)**. The patient was called for postoperative 1sst week and 2nd week controls **(1J,K)**. As a result of the 6-month follow-up, it was observed that there was a 5 mm decrease in the probing depth in the relevant tooth and a 3 mm probing depth **(1L,M)**.

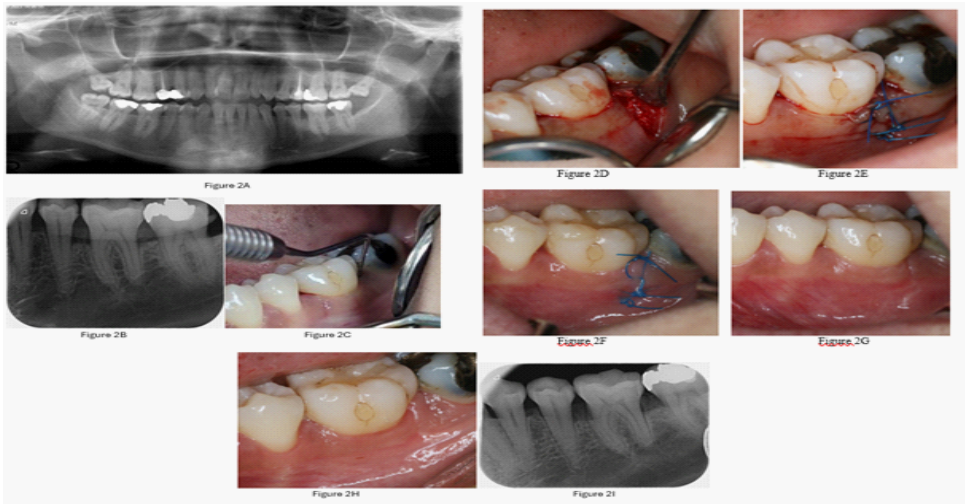

Figure 2: In the radiographic examination of a 32-year-old systemically healthy female patient who came to our clinic due to gingival bleeding, bone loss was detected in the distal part of tooth number 36 **(2A,B)**. During clinical examination, a pathological pocket was found and an intrabony on defect was detected along with the periapical tissue taken **(2C)**. After the granulation tissues were removed, dental allograft was applied **(2D)**. Suturing was performed with 5/0 nylon **(2E)**. Postoperative 1st week and 2nd week controls were performed **(2F,G)**. As aresult of the 6-month follow-up, it was observed that there was a 3 mm drilling depth in the relevant tooth, with a 4 mm decrease in the drilling depth **(2H,I)**.

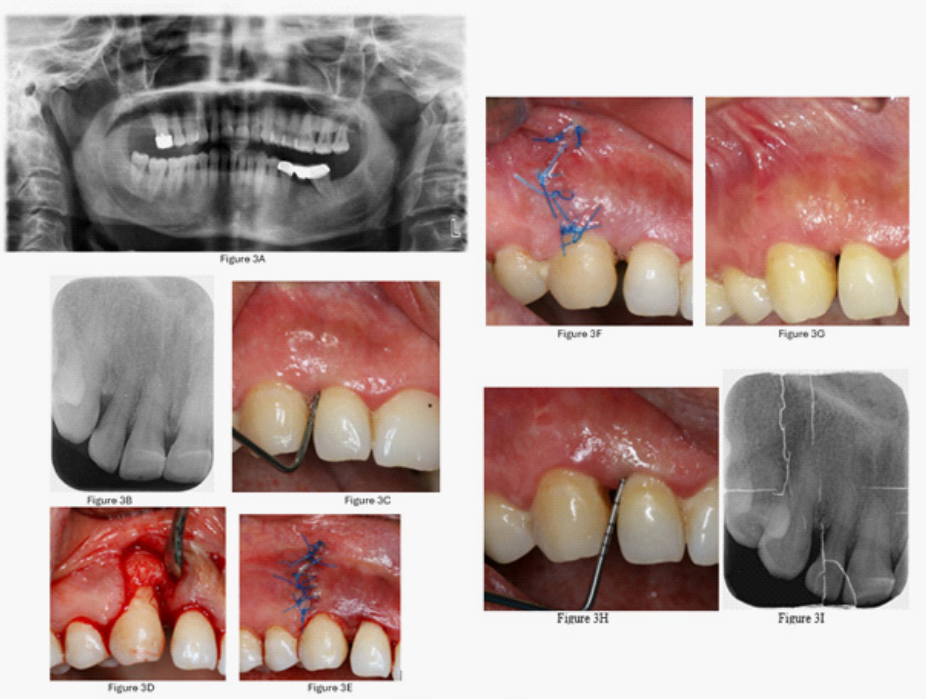

Figure 3: In the radiographic examination of a 50-year-old systemically healthy female patient who came to our clinic due to gingival bleeding, an intrabony defect was detected in the distal part of tooth No.12 **(3A,B)**. Clinical examination revealed 6mm probing depth, bleeding on probing, and 6mm attachment loss **(3C)**. After the granulation tissues were removed, PRF was applied **(3D)**. Suturing was performed with 5/0 nylon **(3E)**. Postoperative 1st week and 2nd week controls were performed **(3F,G)**. As result of the 6-month follow-up, it was observed that there was a 3mm drilling depth in the relevant tooth, with a 4mm decrease in the drilling depth **(3H,I)**.

biomaterials alone does not improve the clinical outcomes of EPP [7]. A one-year prospective cohort study of twelve isolated deep, uninvolved intrabony defects treated with a combination of emdogain and deproteinized bovine bone mineral demonstrated 100% primary closure over the entire wound healing period, resulting in 6.83 mm translated into average clinical attachment gain [7]. In this case series; In all individuals, primary wound healing of the vertical releasing incision, integrity of the interdental papilla, and 100% wound closure were observed throughout the healing period. No adverse events were noted in any of the treated areas, and no postoperative pain or disruption of daily activities was reported. No patient was found to feel the need to take additional painkillers. A reduction in probing depth and clinical attachment loss was observed, and interdental papilla volume was preserved. An overall reduction in whole-mouth plaque and bleeding scores was observed. Although there are very few studies on this subject in the literature, existing reports are mostly presented as case reports. In our case report, results similar to the case reports in the literature were obtained.

Conclusion

"EPP" provides appropriate access to deep interproximal intrabony defects while preserving the integrity of the interdental papilla with the defect. The EPP system in our cases resulted in 100% closure of the defect record throughout the entire healing period. In line with these results, it can be said that the EPP technique is a successful technique in the treatment of intrabony defects and provides bone filling without causing gingival recession and tissue loss.

Plain language summary: The "Entire Papilla Preservation (EPP)" technique offers a novel approach to treating deep bone defects in the gums by keeping the papilla intact. This method involves a precise incision to access the defect, allowing for effective cleaning and bone grafting. In this study, three patients underwent the EPP procedure, which included careful incisions and grafting, followed by a seamless suturing process. Postoperative care included antibiotics, pain relief, and antiseptic mouthwash. The results were impressive: all patients experienced perfect wound healing, with no adverse effects. Six months later, there was a significant reduction in probing depth, and bleeding was minimal. This technique not only preserves the critical papilla but also promotes superior healing and stability in gum tissue, making it a promising solution for those with advanced periodontal disease.

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Authors' contrubitions: Fatma Uçan Yarkaç devolped the idea and protocol fort his incision design. Seray Altun performed the clinical evaluation and periodontal treatment. Fatma Uçan Yarkaç oversaw the procedure. Seray Altun prepared the original draft. Fatma Uçan Yarkaç finalized the manuscript. Seray Altun and Fatma Uçan Yarkaç reviewed and approved the final manuscript.

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