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PAPER

Management of Anterior Dehiscence Defects Using Guided Bone/Tissue Regeneration with Connective Tissue Graft and Platelet-Rich Fibrin: A Case Series

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ABSTRACT

Alveolar dehiscence and gingival recession are periodontal defects that impair aesthetics and function, especially when present in the anterior region. Conventional surgical techniques, such as coronally advanced flaps and connective tissue grafts, may enhance soft tissue coverage but fail to correct the bone defects. To rectify this, regenerative strategies that include guided bone and tissue regeneration (GBR/GTR) and autologous platelet concentrates like platelet-rich fibrin (PRF) have shown potential with promising results. However, reports combining GBR/GTR and PRF treatment of anterior alveolar dehiscence defects remain limited. This case series demonstrating the combined use of guided bone/tissue regeneration, connective tissue grafting, and both injectable and membrane forms of platelet-rich fibrin for the management of anterior alveolar dehiscence defects. This report discusses two cases of anterior alveolar dehiscence with gingival recession that were treated with a combined regenerative protocol. In Case 1, a 28-year-old female with a peri-implant dehiscence defect was treated with "sticky bone", which was made by mixing her own bone with injectable PRF, a connective tissue graft (CTG), and an advanced PRF membrane. In Case 2, a similar presentation maxillary central incisor of a 25-year-old female was treated with allogeneic bone graft, injectable PRF, CTG, and a PRF membrane. Both cases adhered to minimally invasive surgical protocols, complemented by postoperative injectable PRF applications. After six months, both patients showed a big improvement in gingival thickness, bone regeneration, soft tissue stability, and aesthetic results. There were no reported problems, and the patients were satisfied with the results. The combined application of guided regeneration, connective tissue grafting (CTG), and platelet-rich fibrin (PRF) presents a minimally invasive and biologically orientated technique that improves outcomes for both hard and soft tissues. Additional long-term studies are necessary to validate its predictability and clinical stability.

KEYWORDS

tissue regeneration, guided, bone regeneration, platelet rich fibrin, osseous defect, allograft, case report

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1 INTRODUCTION

Conditions such as bony defects, furcation involvements, and mucogingival deformities such as alveolar dehiscence and gingival recession are periodontal defects that can negatively impact the quality of life in terms of the function and aesthetics, especially when the teeth in the anterior regions are involved.

Alveolar dehiscence is defined by the absence of alveolar bone overlying the root surface, at least 4 mm apical to the margin of the interproximal bone, while gingival recession is defined as the apical migration of the gingival margin relative to the cementoenamel junction. Both conditions are interrelated, as dehiscence frequently predisposes the overlying gingiva to recession due to reduced osseous support [11].

Despite encouraging results in the literature, reports combining GBR/GTR, CTG, sticky bone, and both PRF membranes and i-PRF for the treatment of anterior alveolar dehiscence defects remain limited. The following two cases present a biologically driven, integrative approach that achieved successful functional and aesthetic outcomes, highlighting its potential as a predictable treatment strategy.

2 LITERATURE REVIEW

Conventional management strategies for these defects vary and include non-surgical approaches such as scaling and root planning, which remove plaque and calculus deposition but do not regenerate lost structures [1]. Surgical approaches, including coronally advanced flaps (CAF) and connective tissue grafts (CTG), are the gold standard for gingival augmentation and root coverage [3]; however they, do not regenerate the underlying lost bone. Hard tissue regeneration can be achieved with guided tissue regeneration (GTR) with barrier membranes and bone grafts; however, outcomes are often unpredictable due to risks of membrane exposure and graft resorption [2].

Usage of autologous platelet concentrates such as platelet-rich fibrin (PRF) has gained popularity as a tissue regenerative technique advancement in recent years. PRF releases growth factors that promote angiogenesis, fibroblast proliferation, and bone remodelling [6]. The clinical application of PRF has expanded through minimally invasive delivery of bioactives using injectables in the management of wound healing, acceleration of orthodontic tooth movement, as well as regeneration of bone, periodontal, cartilage and pulp tissue [4]. The “sticky bone” technique, combining PRF with bone graft particles, enhances graft stability and handling while prolonging growth factor release [12] [14]. Moreover, use of connective tissue grafts with PRF as an adjuct has been shown to improve gingival thickness and stability, resulting in enhancement of both functional and aesthetic outcomes [5].

2.1 Case report

Case 1. A 28-year-old female patient presented with an aesthetic concern related to the anterior dehiscence defect at the gingival line of implant of tooth 21 (Figure 1). A treatment plan was formulated and discussed with the patient to address her concern. The chosen treatment combined guided bone regeneration with a connective tissue graft (CTG) to peri-implant hard and soft tissue defects.

3 MATERIALS AND METHODS

Following standard preoperative rinses and anaesthesia, a full-thickness flap was raised, and the defect was debrided and irrigated (see Figure 2). A CTG was harvested from the hard palate area (see Figure 3) and an autogenous bone graft was harvested from the area apical to the defect site (see Figure 4).

Fig. 1. Preoperative clinical presentation showing peri-implant soft tissue recession and associated labial bone defect in the maxillary lateral incisor region

Fig. 2. Elevation of a full-thickness mucoperiosteal flap following local anesthesia to expose the peri-implant defect

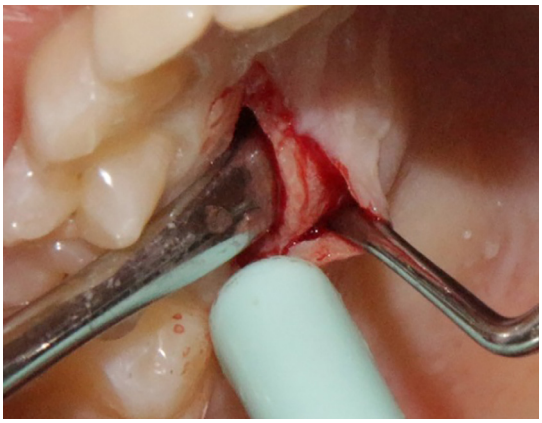

Fig. 3. Harvesting of the connective tissue graft from the hard palate

Fig. 4. Harvesting of autogenous bone graft from the area apical to the defect site

Platelet-Rich Fibrin (PRF) (injectable and membrane forms) was prepared using Choukroun's protocol as described in a previous study. The harvested autogenous bone graft was mixed with i-PRF to form a cohesive "sticky bone" graft. The sticky bone was placed into the defect, followed by placement of the connective tissue graft (se Figure 5). A-PRF membrane was applied over the grafted area to serve as a biologic barrier. Suturing was performed using a sling suture technique to stabilise the connective tissue graft, followed by simple interrupted sutures to achieve flap closure and promote soft tissue regeneration (Figure 6). A periodontal dressing was applied to protect the surgical area.

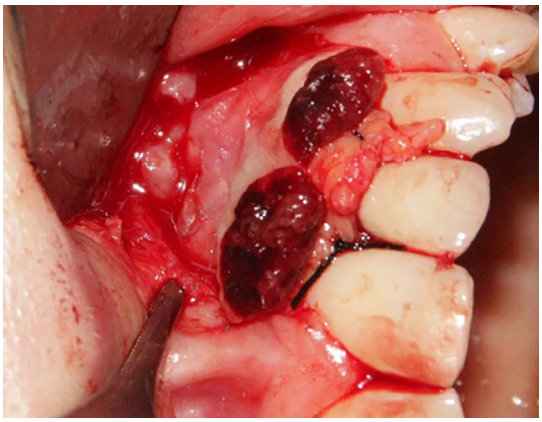

Fig. 5. Placement of sticky bone and connective tissue graft with A-PRF membrane coverage

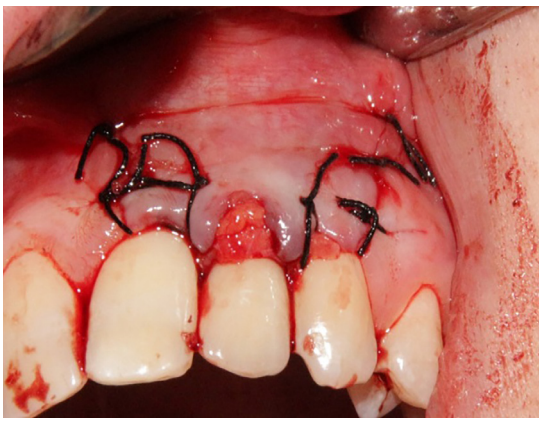

Fig. 6. Sling sutures and simple interrupted sutures used for flap closure

Postoperatively, the patient was prescribed amoxicillin and metronidazole (500 mg, twice daily) for five days. Post-operative instruction included avoiding chewing using the teeth at the surgical area and rinsing with 0.12% chlorhexidine mouthwash for 10 days.

Clinical follow-up at two weeks demonstrated satisfactory soft-tissue vascularisation without pain or swelling. At the two-month review, clinical evidence of soft- and hard-tissue regeneration was observed. However, due to incomplete healing and aesthetic concern (see Figure 7), adjunctive i-PRF injections were administered twice monthly for three months. A final follow-up at six months revealed complete healing with favourable aesthetic outcomes (see Figure 8).

Fig. 7. Two-month postoperative view showing incomplete healing and aesthetic concern

Fig. 8. Six-month follow-up demonstrating complete healing with satisfactory aesthetic outcome

Case 2. A 25-year-old patient with a dehiscence defect and gingival recession of the upper left central incisor (21) (see Figure 9) attended the clinic concerned with the appearance. Guided tissue regeneration was planned for the management of a dehiscence defect affecting tooth 21.

4 RESULTS

Similar to Case 1, preoperative rinses and anaesthesia were followed by a full-thickness flap elevation, thorough debridement, and irrigation (see Figure 10). Scaling and root planting were performed, with additional root conditioning using 24% EDTA for two minutes, followed by a saline rinse.

The preparation of the injectable platelet-rich fibrin (i-PRF) and advanced platelet-rich fibrin (A-PRF) membranes was done according to Choukroun's protocol. Allogeneic bone granules were mixed with i-PRF to form a cohesive sticky bone graft. The sticky bone was placed into the dehiscence defect, followed by placement of the connective tissue graft and coverage with an A-PRF membrane (see Figure 11).

Fig. 9. Preoperative view showing gingival recession and dehiscence defect at the maxillary left central incisor (tooth 21)

Fig. 10. Full-thickness mucoperiosteal flap elevation with debridement and irrigation of the defect site

Fig. 11. Placement of sticky bone, connective tissue graft, and coverage with an advanced platelet-rich fibrin membrane

Suturing mirrored Case 1 (sling and simple closure). Injectable PRF was administered twice monthly for three months (see Figure 12). At the six-month review, complete healing of both soft and hard tissues was observed, with stable gingival texture and improved aesthetics. The patient was satisfied with the final appearance (see Figure 13).

Fig. 12. Suturing using sling and simple interrupted techniques, followed by adjunctive injectable platelet-rich fibrin application

Fig. 13. Six-month postoperative clinical view showing complete soft- and hard-tissue healing with stable gingival architecture and improved aesthetics

4.1 Discussion

Defects in the bone and soft tissues around natural teeth or implants, such as dehiscence and recession, do not only compromise the aesthetics but also pose, challenges in oral hygiene care, as they can be plaque retentive and lead leads to symptoms such as hypersensitivity and cervical caries. Restoration of adequate bone and gingival coverage in such defects is crucial to ensure the function and aesthetics of the periodontium [10].

In both cases reported, the primary concern of the patients was aesthetic. However, the aim was not only to improve the aesthetic but also to achieve long-term stability of the regenerated tissues, good acceptability of the treatment by the patient and also minimally invasive procedures with reduced complications. CTG is regarded as the gold standard procedure for soft tissue augmentation, such as in both cases, and has shown to provide augmentation, providing predictable results in terms of root coverage and stability of gingival margins, and risk of further recessions in the future

is reduced. Bone grafting was done in both cases to restore the lost alveolar bone. However, in case 1, autograft was used, as it is the gold standard for bone regeneration procedures and provides most predictable results and in case 2, allograft was utilised to avoid surgical procedures and donor site morbidity [13]. Allograft are also simpler and quicker and still support bone healing and regeneration, especially when combined with PRF and membranes.

In the cases presented, advanced forms of PRF (A-PRF) were used, which have been shown to release greater quantities of growth factors for longer durations compared to conventional PRF [8, 9]. Injectable PRF (i-PRF) was also used, as it contains high concentrations of cells and bioactive molecules in a liquid form that can be applied during or after surgery to stimulate angiogenesis, improve gingival contour, and support long-term stability [7].

5 CONCLUSION

The goal of restoring the lost hard and soft tissue in both cases with anterior dehiscence defects was achieved using a. Improvements were achieved in gingival thickness, bone volume, and overall aesthetic findings highlight the value of a biologically driven approach that simultaneously addresses hard and soft tissue deficiencies.

The acceptability of the procedure by the patient is an important aspect to consider when treatment options were planned. In both cases, minimally invasive approaches were chosen, in combination with autologous and biocompatible materials. The procedures were generally well tolerated by the patients and more invasive surgical procedures were avoided. The patient's aesthetics concerns were addressed, and their satisfaction with the final outcome also highlights the success of the treatment, as it can have a significant impact on their quality of life. Thus, the procedure of combining the A-PRF and CTG was not only was clinically successful, but patient centred treatment with the treatment goals of less invasive greater acceptance and improvement in aesthetics and function were also achieved.

5.1 Limitations

One of the limitations of this case report is the lack of long-term follow-up. While 6 months outcomes were satisfactory, a longer review of one year is required to reflect the long-term sustainability of the outcomes. Future research to investigate the long-term stability of regenerative procedures is recommended, as well as randomised trials to compare different regenerative approaches with gold standard methods to establish a novel clinical protocol to manage periodontal defects.

6 AUTHORS' CONTRIBUTIONS

MM conceptualised and designed the study, performed the clinical procedures, collected and analysed the data, and drafted the manuscript. MM critically revised the manuscript and approved the final version for submission.

7 FUNDING

No external funding was received for this study.

8 AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article. Additional information is available from the author on reasonable request.

9 ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the patient prior to treatment.

10 INFORMED CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal.

11 COMPETING INTERESTS

The author declares that there are no competing interests.

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