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Platelet-rich fibrin, a physiological concentrate in the management of buccal dehiscence of implant – A case report

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ARTICLE INFO

Article history:
Available online 9 January 2016

Keywords:
Dental implant
Dehiscence
Platelet-rich fibrin

ABSTRACT

Introduction: Successful implant dentistry is based on proper selection of patients, careful surgery, preplanned restorations, and postoperative and supportive care. Although implant therapy is highly successful and predictable, it is not without early and/or late complications. Placement of dental implants in narrow or atrophic edentulous ridges often leads to complications, such as dehiscence and fenestration.[1]

Case report: This case report presents the successful management of buccal dehiscence of single-staged implant for replacement of left central incisor with the platelet-rich fibrin (PRF) and autogenous bone graft material. The initial mobility was completely resolved after 12 weeks and final restoration was given to patient.

Discussion: The treatment for dehiscence requires the use of various regenerative procedures but PRF belongs to a new generation of platelet concentrates geared to simplify preparation without biochemical blood handling.[2] Adjunctive implantation of PRF does appear to significantly improve the healing response, which has resulted in rapid, clinically relevant bone closure of dental implant dehiscence defect in the present case.

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1. Introduction

Platelet-rich fibrin (PRF) is an immune and platelet concentrate, collected on a single fibrin membrane containing all the constituents of a blood sample, and favorable to healing and immunity.[1] Though platelet and leukocyte cytokines play an important part in the biology of this biomaterial, the fibrin matrix supporting them certainly constitutes the determining element responsible for the real therapeutic potential of PRF.[2] All of the known clinical applications of PRF highlight an accelerated tissue cicatrization due to the development of effective neovascularization, accelerated wound closing, and nearly total absence of infectious event.[3]

Blood supply, i.e. vascularization, is a prerequisite for successful osseointegration of oral implants. Platelets are a well-known source of growth factors, such as platelet-derived growth factor and transforming growth factor, which play stimulatory and regulatory functions in cellular process, such as mitogenesis, differentiation, and chemotaxis, as well as promoting angiogenesis in hard and soft tissues healing.[4]

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http://dx.doi.org/10.1016/j.jpfa.2015.10.002

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Alveolar ridge augmentation to facilitate implant placement is an accepted treatment option in areas in which the bone volume is inadequate and implant stabilization is not likely.

The augmentation is intended to produce an appropriate bone contour that allows implant placement in an adequate prosthetically directed position so that implant should be sufficiently stable and have appropriate bone contact.[5]

2. Case history

A 19-year-old male patient was referred from the department of periodontics with the chief complaint of mobility with implant, which was placed 1 month before in the position of maxillary left central incisor (#21). The 3.3 mm × 10 mm size, single-staged implant, was selected and drilled into the narrow ridge. During the procedure, buccal dehiscence occurred accidentally at the buccal aspect of the implant by the prosthodontist.

On clinical examination after one month, the mobility of implant was grade II with radiolucency seen around implant screws in preoperative IOPA (Figs. 1 and 2). Thereafter, the patient was referred to department of periodontics for management.

2.1. *Surgery*

Local anesthesia was obtained by infiltration of adrenaline supplemented with epinephrine 1:2,00,000 to ensure proper hemostasis. Buccal releasing incisions were designed at the mesial aspects of the maxillary right central incisor and maxillary left lateral incisor.



Fig. 1 – Preoperative IOPA showing radiolucency around implant in position of #21.

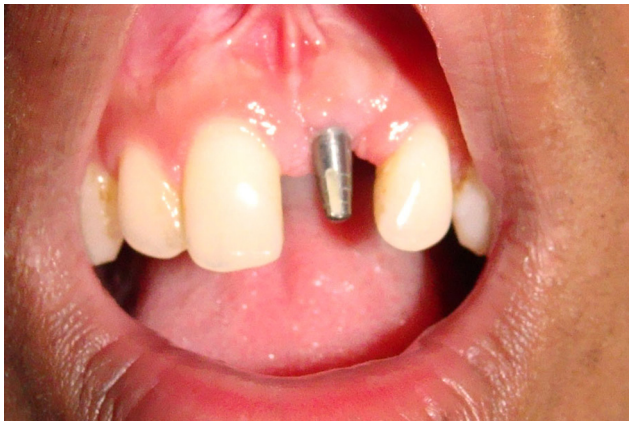


Fig. 2 – Preoperative clinical view of single-staged implant placed.

Surgical exploration of buccal dehiscence was done with a full thickness flap, which was reflected and debrided using titanium curettes (Fig. 3). The autogenous bone graft was achieved from the maxillary right first molar region (Fig. 4) along with freshly prepared PRF (Fig. 5). The exposed implant surface was completely covered with combined graft material (Figs. 6 and 7), site was sutured with, and proper hemostasis was obtained. The healing was uneventful during the first week, and at suture removal. The patient was checked weekly for the first 4 weeks and then monthly until final restoration delivery (Fig. 8). The grade of implant mobility was clinically assessed, which reduced 12 weeks after the surgical procedure. The final restoration depicted no clinical mobility after 1 year and also the occlusal radiograph showed some evidence of bone gain seen around dental implant (Fig. 9). Tooth #11 depicted bone external root resorption for which the patient was referred to the department of endodontics for further management.

2.2. *Technique of PRF preparation*

PRF was first developed in France by Choukroun et al.[6] for specific use in oral and maxillofacial surgery. The PRF protocol

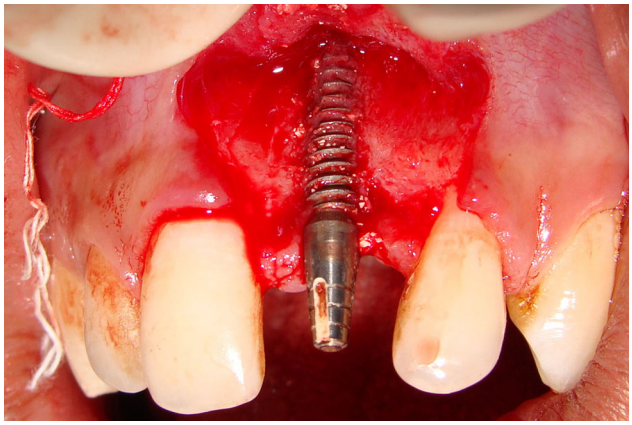


Fig. 3 – Buccal dehiscence seen around the implant on surgical exposure.

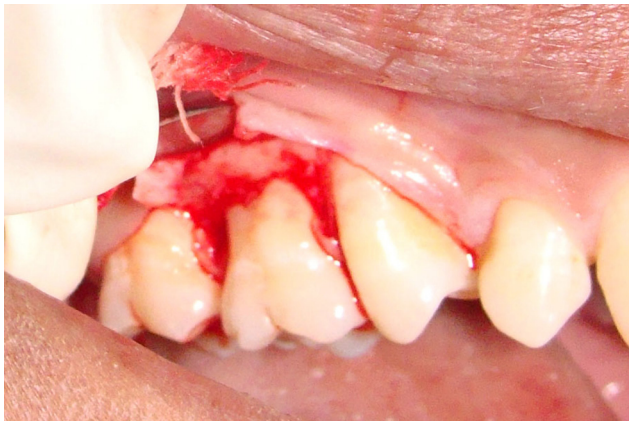


Fig. 4 – Autogenous graft derived from donor site.



Fig. 5 – Platelet-rich fibrin prepared.

is a very simple procedure: a blood sample is taken without anticoagulant in 10-mL tubes, which is immediately centrifuged at 3000 rpm. The absence of anticoagulant implies the activation in a few minutes of most platelets of the blood sample in contact with the tube walls and the release of the coagulation cascades. Fibrinogen is initially concentrated in the high part of the tube, before the circulating thrombin transforms it into fibrin. A fibrin clot is then obtained in the

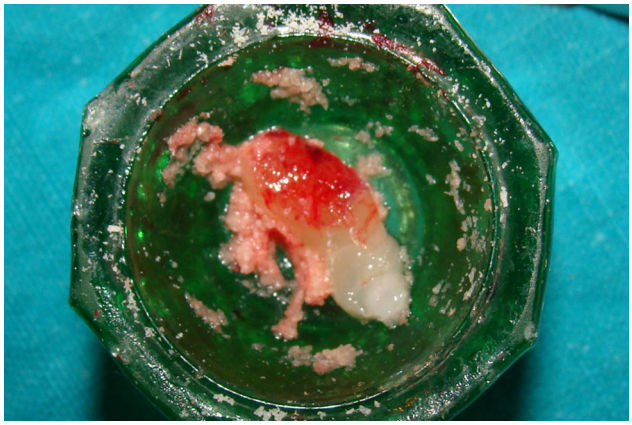


Fig. 6 – Combined graft material.

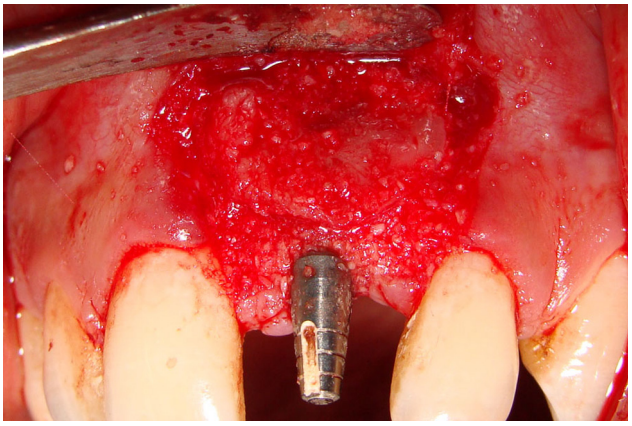


Fig. 7 – Buccal dehiscence grafted with combined graft material.



Fig. 8 – Postoperative clinical view after 4 months.



Fig. 9 – Postoperative occlusal view showing radiopacity around the implant screws.

middle of the tube, just between the red corpuscles at the bottom and acellular plasma at the top.[7]

3. Discussion

The aim of this article was to highlight the importance of a relatively neglected subject of dehiscence wounds in the dental implant literature and it deserves documentation to confirm a strategy for their avoidance and management.[8]

Alveolar bone formation at dental implant dehiscence defects, following guided bone regeneration and xenogeneic freeze-dried demineralized bone matrix, have been documented.[9] The bone regeneration of dental implant dehiscence using cultured periosteum membrane has also been reported.[10] In the present investigation, the bone healing after augmentation and the incorporation of autograft along with PRF were studied clinically after 1 year. This undisturbed period of healing and possible remodeling of the autograft with PRF helped to stabilize the implant and healing at the dehiscence site.

PRF is considered as a fibrin biomaterial. Its molecular structure with low thrombin concentration is an optimal matrix for migration of endothelial cells and fibroblasts. It permits a rapid angiogenesis and an easier remodeling of fibrin in a more resistant connective tissue. Therefore, these PRF membranes can be used for all types of superficial cutaneous and mucous healing. Not only is it a simple fibrin membrane but also a matrix containing all the molecular and cellular elements permitting optimal healing. The matrix carries all the favorable constituents present in a blood sample. That is why this biomaterial can be considered a physiologic concentrate. It is obtained without any addition or manipulation.

The present case provides the successful treatment of dehiscences with PRF and autogenous bone graft at the implant dehiscence site. However, it is now necessary to look further into platelet and inflammatory features of this biomaterial. Only a perfect understanding of its components and their significance will enable us to comprehend the clinical results obtained and subsequently extend the fields of therapeutic application of this protocol.

4. Conclusion

Thus, with this article, we can conclude that the new and recent generation of platelet concentrate – PRF – would be a good friend to the periodontist and oral surgeons in the near future. PRF contains the platelet growth factors and this fibrin matrix guides the healing processes. It also plays an important role in the revascularization of the graft by supporting angiogenesis. These steps toward regeneration of the bone require further application. This material is already being used widely in France, and considering its advantages, its popularity should increase the other parts of the world too.[11]

Conflicts of interest

The authors have none to declare.

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