

# A new approach for better anterior esthetic using platelet-rich fibrin as sole graft material combined with ovate design dental bridge

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## Abstract

Alveolar ridge deficiency is considered a major esthetic limitation, especially in the maxillary anterior region. Several approaches have been developed to enhance and increase the soft-tissue volume. Among those approaches are connective tissue grafts, platelet-rich fibrin (PRF) membrane and implying the guided bone regeneration concept. The PRF grafting technique was employed in this clinical case to improve and enhance the anterior esthetic without the need for the bone graft and augmentation. This article describes the use of PRF as a sole grafting material for both socket and soft-tissue augmentation for a 23-year-old male, who had an accident 8 years ago while he was playing a basketball, which caused his upper front teeth to be intruded and discolored. The upper left central tooth suffered a major external root resorption; hence, it was extracted. PRF was prepared and packed in and extruded out of the socket. This was combined with ovate design provisional bridge. Ten days, 1 month, 3 months, and 6 months postoperative review showed a significantly well-progressed healing. According to the encouraging result obtained in this clinical case in regard to tissue healing and esthetic, the PRF can be a potential sole graft material for small anterior deficient areas. This may reduce the need of bone augmentation and graft in such selected cases.

**Keywords:** Esthetic, ovate pontic, platelet-rich fibrin

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## INTRODUCTION

Once teeth are extracted, the residual alveolar ridge usually heals with deficient contour, especially when the extraction is due to periodontal-periapical lesions.<sup>[1]</sup> For upper anterior teeth extraction, the residual alveolar ridge resorption would compromise the esthetics making the prosthodontic management of such cases more challenging.<sup>[1,2]</sup> To overcome such a problem and to restore the ridge contour to more

favorable situation, some authors proposed the use of full-thickness onlay and subepithelial connective tissue grafts.<sup>[3-5]</sup>

It has been advocated more recently the guided bone regeneration (GBR) concept, in which the graft materials would be combined with barriers; this concept was proven to be a predictable method to restore and reconstruct the hard- and soft-tissue deformities.<sup>[6]</sup> These alveolar ridge

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augmenting and regenerative procedures could enhance the esthetic result of fixed partial denture (FPDs) by avoiding the need to include a long, anesthetic pontic in the prosthesis design.<sup>[7]</sup>

Another recent promising option is the use of the platelet-rich fibrin (PRF). The potential of the platelets as a regenerative option was first reported in the 1970s, as they contain growth factors responsible for enhancing the collagen production, increasing blood vessel growth, and the induction of cell differentiation, among others.<sup>[8]</sup> In general, the platelet concentrates are a concentrated growth factor suspension that induce wound healing by acting as bioactive additives that are applied locally during the surgery. There were two major types of platelet concentrates that can be used for tissue engineering applications: platelet-rich plasma (PRP) and PRF. Dr. Choukroun was the first to use PRF in oral and maxillofacial surgery, and since that time, it has been considered as a new generation of platelet concentrate. The PRF, if compared with the PRP, includes easier preparation, and no chemical manipulation of the blood would be necessary.<sup>[9]</sup>

PRF is a complex fibrin matrix that contains autologous platelets, leukocytes, and stem cells, and it works as a biodegradable scaffold and has the ability to guide the migration of the epithelial cells to its surface. It has showed obvious potential for soft-tissue regeneration, without inflammatory reactions, and may be used alone or in combination with bone grafts, promoting hemostasis, bone growth, and maturation. Chen *et al.* have used the PRF to augment the extraction socket with buccal cortical plate dehiscence, and they found that the use of PRF could offer numerous advantages such as improving soft- and hard-tissue wound healing due to fibrin bandage and growth factors' release.<sup>[9]</sup>

This article describes a new approach using the PRF to increase the soft-tissue volume for preprosthetic preparation of a deficient anterior ridge.

## CASE REPORT

A 23-year-old male presented to our oral health center with the complaint of unpleasant smile. He had an accident 8 years ago while he was playing a basketball, which caused his upper front teeth to be intruded and discolored. The patient was referred for diagnostic intraoral periapical radiograph. The X-ray showed that both the upper left central and right lateral incisor teeth were treated with root canal therapy. Furthermore, the upper left central tooth suffered a major external root resorption [Figure 1]. Using

digital smile system software DSS (DSS v1.9.4, Just digital company, Italy), the smile has been analyzed. Moreover, digital mock-up was designed to assess the space availability and the need for ridge augmentation [Figure 2]. After a multidisciplinary discussion, a decision was made to extract the upper right central incisor, augment the defected socket as well as compensating the expected deficient soft tissue with PRF, and then provide the patient with a layered zirconia dental bridge incorporating into design an ovate pontic.

## Clinical procedure

Teeth preparations were carried out for both the upper left central and right lateral incisor teeth adjacent to the tooth to be extracted. An irreversible hydrocolloid impression of the maxillary arch including both the teeth prepared and the tooth to be extracted was made. The upper right central was scored off from the poured cast making 3 mm depression simulating the postextraction socket. Moreover, to simulate the gingival volume expected to be gained postplacement of PRF membrane, plaster of Paris has been added to the labial gingival margins. Provisional dental bridge was fabricated using Protemp™ 4 Temporization and RelyXTM [Figure 3].

A volume of 20 cc of the patient's own blood was drawn to prepare the PRF before the extraction of the indicated tooth. The upper right central was extracted atraumatically taking great care to preserve both buccal and lingual plates. The extracted socket was debrided from the remnant granulation tissue and refreshing bleeding was achieved using Busar periosteal elevator instrument. This was very crucial to preserve the bone as well as to maintain the interdental papillae. Neither bone dehiscence nor fenestrations were noticed. The extracted socket was then packed with the PRF; the PRF membrane was extruded out of the socket to fill up the labial gap formed postextraction of the upper right central. A tension-free horizontal mattress suture was placed to fix the membrane in place [Figure 4].

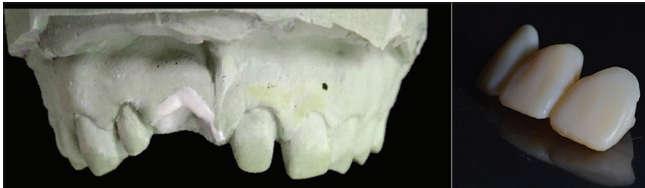
The patient was followed up at 10 days for review and suture to be removed, 1 month, 3 months, and 6 months subsequently. The final impression for the preparation was taken 3 months later following the PRF placement, and the final prosthesis was cemented in place [Figures 5-8].

## DISCUSSION

Dental esthetics significantly influences how an individual is perceived and evaluated. It is exceptionally challenging for any clinician in the esthetic zone as the expectations are significantly increased. Improvements in the patient's smile can boost their self-esteem and be life changing.



**Figure 1:** (a and b) (Left) Discoloration and intrusion of 12 and 11 teeth, (right) preoperative intraoral periapical view



**Figure 3:** (Left) Plaster of Paris has been added to the labial gingival margins of the tooth 11. (right) Provisional dental bridge with the ovate pontic design

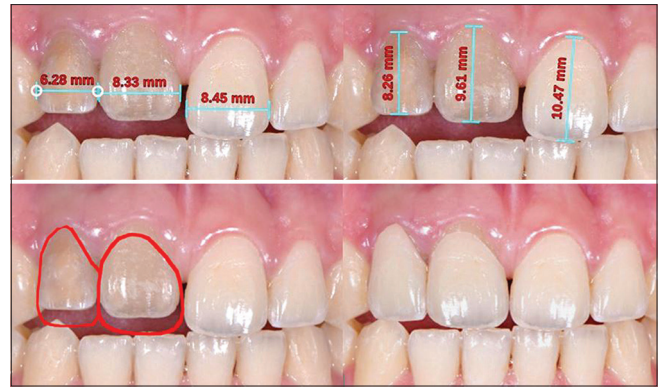


**Figure 5:** The 10 days following up

The decision whether to carry out immediate or delayed augmentation of alveolar ridge defect after infected and/or resorbed tooth extraction is considered one of the debate topics. The major objective is to achieve the optimal residual ridge width and subsequently the esthetic improvement as well as better foundation for later prosthesis design.<sup>[10,11]</sup>

One of the most common options is to use GBR which is predictable, and its success is well documented with either nonresorbable or resorbable membranes. On the other hand, the early membrane exposure is one of the most common clinical complications in GBR and that may compromise healing.<sup>[11]</sup> The PRF is a potential alternative, as it includes easier preparation, and no chemical manipulation of the blood would be necessary.<sup>[11,12]</sup>

In this case, after extraction of the tooth 11, the residual alveolar ridge had a Class II defect according to Siebert's classification.<sup>[4]</sup> The clinician has followed a new approach to augment the soft-tissue defect vertically using the PRF as a sole graft material. The use of the PRF combined with bone graft for the buccal cortical plate dehiscence management has already been reported.<sup>[9]</sup> Zhao *et al.* studied



**Figure 2:** Digital smile analysis and designing using DSS software



**Figure 4:** (a and b) The platelet-rich fibrin was packed in place to compensate the gum deficiency following the placement of the provisional restoration



**Figure 6:** One-month postoperative review

the effect of using PRF as a sole grafting material, and they found it to preserve the alveolar ridge.<sup>[13]</sup> However, for this patient, the PRF was used as a sole graft material for both socket packing and to increase the alveolar ridge height; hence, the first benefit is given by improving the esthetic appearance instead of waiting the gingiva to fill the gap, and this provides greater comfort to the patient in the postoperative period as well as reducing the healing





**Figure 7:** The healing of the pontic area at 3-month following up

time. The PRF played an important role in reducing the pain by avoiding food stagnation inside the socket, avoiding postoperative swelling and achieving fast hemostasis. By drawing the patient own blood and preparing a PRF, it was very significant cost cutting instead of using bone graft materials and membranes. To our knowledge, this is the first reported case to use the PRF in such manner for such purpose. The PRF membrane was stabilized in place by a tension-free horizontal mattress suture to ensure keeping the PRF in place. The grafting was combined with the use of ovate pontic design to guide the tissue healing and growing. The use of restorative design with ovate pontic is a well-established method to guide the soft-tissue healing to more favorable contour.<sup>[14]</sup> The result was promising, as the ridge gained height, and the gap cervical to the ovate was completely obturated within the first 2 weeks. The real challenging part was to regain the interdental papilla; at the 10-day review visit, it has been noticed that black triangle still there, especially distal to the upper right lateral. The ovate pontic neck then was adjusted and reformed at the neck region by adding flowable composite resin (PermaFlo Flowable Composite; Ultradent Products Inc., South Jordan, Utah) to compress the soft tissue and to enhance the interdental papilla esthetic. The effect of that was immediate and the black triangle disappeared.

This procedure depends mainly on using PRF as a sole graft material. However, this procedure has several disadvantages and limitations such as the success and predictability of this protocol relies on the handling, blood collection time and its transference for the centrifuge, the patient may refuse the puncture required for blood collection, rigidity lack and fast degradation of the PRF, the size of the defect and amount of bone loss.<sup>[15,16]</sup>

By the end of the treatment, the patient was satisfied with the results and his psychology and self-confidence have been improved.



**Figure 8:** Six months after platelet-rich fibrin placement

### Clinical significance

According to the encouraging result obtained in this clinical case in regard to tissue healing and esthetic, the authors suggest that PRF can be used as a sole graft material for small anterior deficient areas. This may reduce the need of bone augmentation and graft in such selected cases. Further studies are needed to validate the clinical result.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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