



XENOGRAFT IN COMBINATION WITH CONCENTRATED PLATELET RICH FIBRIN FOR SOCKET AUGMENTATION IN MAXILLA - A NOVEL CASE REPORT

Periodontology

Vinaya Rudresh*

MDS, Ph.D Associate Professor, Department of Periodontics, Krishnadevaraya College of Dental science and Hospital, Bangalore- 562157, Karnataka, India*Corresponding Author

Prabhuji MLV

MDS Professor and HOD, Department of Periodontics, Krishnadevaraya College of Dental science and Hospital, Bangalore- 562157, Karnataka, India

Apeksha Vikas Kamble

MDS, Clinical Practitioner, Department of Periodontics, Krishnadevaraya College of Dental science and Hospital, Bangalore- 562157, Karnataka, India

ABSTRACT

While exploring the treatment modalities for replacement following teeth loss, the ultimate aim of therapy is to offer a functional restoration in unison with the adjacent natural dentition. In this innovative case study, extraction and augmentation of the ridge defect were performed on grade III mobile teeth exhibiting radiographic bone loss extending to the apical third of the tooth no.11, 21, 21 and 22. The procedure involved the amalgamation of xenograft (osseograft) with the latest concentrated platelet-rich fibrin technology. After healing uneventfully for 3 months, dental implants were placed. The combination of Xenograft with C-PRF demonstrated notable bone formation at 3 months, as evidenced by clinical and histological assessments. Radiographic analysis at 3 months showed significant bone improvement, indicating a favorable outcome with the use of this biomaterial in socket reconstruction. This case highlights the efficacy of employing Xenograft and C-PRF together as one of the successful treatment advances.

KEYWORDS

Xenograft; DMBM; Concentrated platelet rich fibrin; Implant.

INTRODUCTION

Periodontitis causes tissue destruction and eventual tooth loss. After extraction, horizontal and vertical ridge resorption may compromise implant placement, especially in esthetic areas.¹ Socket preservation helps minimize this resorption using various biomaterials.² Although autografts are considered the gold standard, their limitations have led to the use of alternatives such as xenografts. Deproteinized bovine bone mineral (DBBM) acts as an osteoconductive scaffold with slow resorption, aiding space maintenance for bone regeneration.³ Combining xenografts with concentrated platelet-rich fibrin (C-PRF), rich in growth factors, may enhance graft stability and healing. This case report presents socket preservation using DBBM with C-PRF followed by successful implant placement after 3 months.

CASE REPORT

A 38 year old female patient reported with a chief complaint of mobility in relation to 11,12, 21 and 22. Patient gave a history of mobile teeth in the last 2 years. Upon clinical examination, grade III mobility was reported along with pocket probing depth (PPD) of 8 to 10 mm and the initial radiographic evaluation through OPG revealed bone loss extending till the apical third of the tooth in relation to 11,12, 21 and 22 (Fig 1). The poor prognosis of these teeth was the reason for extraction. Patients were systemically healthy and not under any medication. The treatment modality advised to the patient was extraction of the affected teeth, followed by placement of a xenograft in combination with C-PRF.

After administration of local anaesthetic solution*, atraumatic extraction of 11, 12, 21 and 22 was performed (Fig 2b). A full thickness mucoperiosteal flap was raised to visualize 1-1.5 mm of marginal bone (Fig 2b). Thorough socket debridement was done. For C-PRF, 10 ml of patient's blood was drawn and transferred to a vacutainer for centrifugation. Blood was centrifuged at 2700 rpm for 8 minutes. The liquid PRF that was directly obtained from the buffy-coat layer was referred to as concentrated PRF (C-PRF)^[5] (Fig 2c). The C-PRF was mixed with the xenograft[†] to obtain a mixture of moldable consistency (Fig 2d), which was packed and condensed in the extraction socket (Fig 2e and f). Suturing was done with the help of continuous suturing technique (Fig 2g) and patient was recalled after 10 days for suture removal. Patients were followed up for further implant placement. Two implants[‡] were placed under standard protocols (Fig 3a-c) and a torque of 40N was obtained during implant placement. The bony particles retrieved during osteotomy were sent for histopathological examination. Flaps were coaped using continuous sutures (Fig 3d). Patient was recalled after a week for suture removal. Final prosthesis was delivered 3 months following implant placement. (Fig-4)

HISTOPATHOLOGICAL FINDINGS

H & E - stained tissue section showed specks of graft material along with immature woven bone with osteocytes within the lacunae (Fig 5a); with surrounding fibrous tissue made of collagen fibers and bundles associated with fibroblasts and fibrocytes (Fig 5b). Focal areas of hemorrhage (Fig 5c) were also evident, and the features were suggestive of "viable bone with normal granulation tissue".

DISCUSSION

Between 3 to 6 months after, tooth extraction substantial bone remodeling in the dental socket is induced.⁴ Various surgical models for GBR have been proposed, with surgical reopening timeframes ranging from 3 to 4 months in most instances, with a few cases requiring 6, 8, or 9 months.^{5,6} In the present case surgical entry for implant placement was planned and sample for Histomorphological analysis was procured during this time. Sacerdotti and Frattin reported new bone formation on day 90 with hematopoietic bone marrow in kidney after ligation of the renal vascular pedicle in rabbit.⁷ However, Toit et al in his histomorphologic study using PRF stated that the harvested bone at 12 weeks was immature.⁸

Sticky bone was introduced by Sohn DS in 2010.⁵ PRF has shown to enhance human healing process in a variety of applications.⁹ Attention has been diverted to the choice of graft material to be combined with PRF as the data on such combinations have been scant in the literature. This case report presents a case of multiple socket augmentation using DMBM graft (Osseograft) in combination with C-PRF. C-PRF's liquid formulation allows excellent flowable properties. It is easily prepared by centrifugation and handled in syringes. The current case report presents a successful case of socket augmentation by combining osseograft with concentrated platelet rich fibrin. Patient was followed up for 10 months, starting from the stage of socket augmentation. The porosity of human bone ranges from 20 to 400 µm, that makes it ideal for penetration, adhesion, growth and proliferation of osteogenic cells. Pores between 100 and 1000 µm are ideal for cell growth, angiogenesis, and adequate bone formation.⁷ Osseograft contains type I collagen and has a particle size of 250 µm and good porosity, which makes it beneficial in bone regeneration procedures. The PRF provides an added advantage in increasing the bulk of bone graft material and also has various other advantages like releasing the growth factors, enhancing soft tissue healing and providing a mouldable form to the material for easy handling and better adaptability. The current protocol of the PRF was followed according to that of Miron et al. (2020) with the protocol being similar to L-PRF preparation but, with reduced centrifugation time and liquid PRF being isolated directly from the buffy coat layer. Miron et al in his study stated a 10-fold increase in the

platelets and WBCs using the C-PRF protocol as compared to I-PRF in the buffy coat layer present just above the RBC corpuscle layer, giving it the name - concentrated PRF (C-PRF). In addition to that, it was also demonstrated that C-PRF had increased growth factor release and higher cellular activity.⁴

Cezar Lahham et al conducted a randomized controlled trial evaluating the efficacy of C-PRF injections through its continuous applications into the extraction sockets and analyzed its effects on both hard and soft tissue dimensions that were altered following tooth extraction. The study showed statistically significant differences in the horizontal and vertical dimensions between the groups after 3 months of healing. Lahham et al's study favours the current study, stating the effectiveness of C-PRF in ridge preservation. As documented by various studies of sticky bone, the procedure appears to be effective in augmentation of alveolar ridge deficiencies.¹⁰

CONCLUSION

Hence Xenograft in combination with C-PRF can be successful in providing a good clinical, histological and radiographical outcome. Among the various regenerative procedures with different combinations of biomaterials that exist for socket augmentation, the line of treatment is highly dependent on the extent of the defect and the specific and necessary treatments for the implant supported rehabilitation. C-PRF with the highest growth factor releasing potential and its combinations remain the future biomaterial option in various fields of dentistry. Therefore, this case report is one of its kind as no similar treatment procedures have been carried out previously to the best of our knowledge, hence making it unique.

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CONFLICT OF INTEREST: NIL

FIGURES



Fig 1 - Pre-operative radiograph

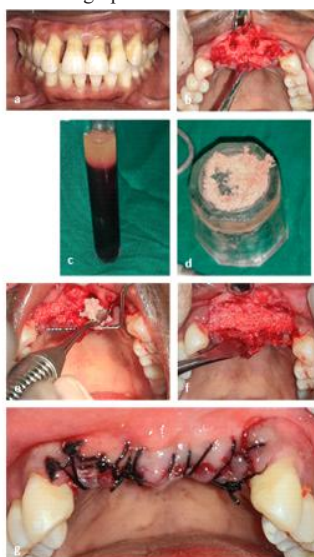


Fig 2 - Case management - a) Pre operative photograph b) Immediate post extraction socket c) C-PRF d) Osseograft mixed with C-PRF e) and f) Sticky bone packed in the extraction sockets g) Sutures

Fig. 3 - Implant Placement

a) Pre operative photograph b) Osteotomy preparation c) Implant placement d) Sutures e) & f) Immediate post operative radiographs

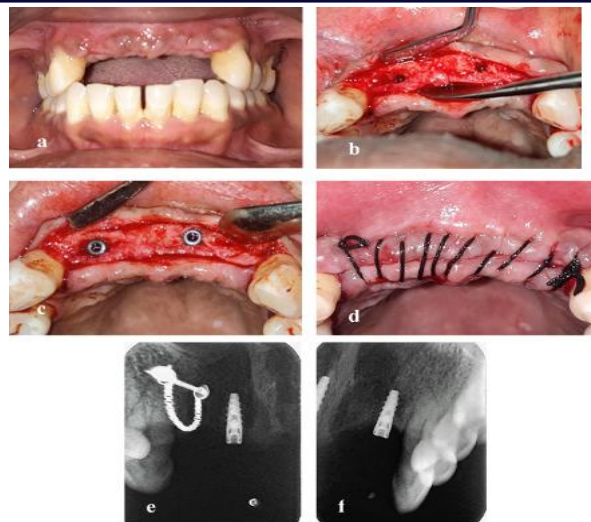
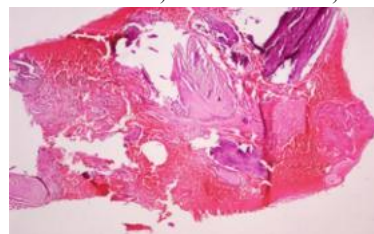


Fig 4 - a) Final prosthesis b) Post-prosthesis placement radiograph



Fig. 5 - Histopathological examination

a) specks of graft material along with immature woven bone with osteocytes within the lacunae b) connective tissue c) Hemorrhage



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