ALVEOLAR RIDGE AUGMENTATION USING L-PRF BLOCK- A CASE REPORT

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Abstract

Aim: The present case report attempts at using autologous bone graft (L-PRF block) for horizontal and vertical augmentation of alveolar bone.

Background: Enhancing the height and width of atrophied alveolar bone subsequent to tooth extraction or loss is essential for significantly enhancing the outcomes of implant therapy.

Case description: A 24-year-old female presented to the Department of Periodontics at the College of Dental Sciences in Davangere, Karnataka, with complaints of a loose tooth and pain in the upper left back tooth region (tooth 24). After evaluation, an intentional root canal treatment (RCT) was planned; however, the prognosis was deemed hopeless as the tooth did not respond adequately to the treatment. Consequently, extraction of tooth 24 was recommended, followed by ridge augmentation to address the observed deficiencies in both horizontal and vertical dimensions of the alveolar ridge. To facilitate optimal implant placement in the future, alveolar ridge augmentation was planned using a combination of an L-PRF block and Bio-Oss, which would support bone regeneration and promote healing at the extraction site.

Conclusion: At the 4-month postoperative evaluation, significant improvements were observed in both horizontal and vertical augmentation

Clinical significance: To minimize the risk of ridge resorption and/or to improve /correct the already existing alveolar ridge deficiency.

Keywords: Horizontal and vertical augmentation, case report, L-PRF block, implant therapy.

INTRODUCTION:

The alveolar process is sensitive to various environmental and physiological factors that influence its function and integrity (Amler et al., 1960, 1969). Despite its significance, the physiology and healing process of the edentulous ridge following tooth extraction were historically overlooked prior to the availability of implant therapy. The loss of mechanical function post-extraction is the primary cause of alveolar bone loss, with approximately 25% of bone volume lost in the first year and potential progression to 40-60% loss within three years (Carlsson et al., 1967).

The resulting ridge deficiency, characterized by rapid vertical bone loss and gradual horizontal dimension reduction, often necessitates interventions to minimize resorption or correct these deficiencies (Tarnow & Eskow, 1995; Sclar, 2004; Seo et al., 2004). Given the typically flat or convex nature of jaw bones, creating a physical space is essential to facilitate regenerative processes leading to alveolar bone augmentation (Oh et al., 2003). This is typically achieved through the use of bone replacement grafts, which serve as scaffolds to support biological events essential for bone formation and subsequent successful placement of dental implants.

Case description:

Following informed written consent from the patient, a full-thickness mucoperiosteal flap was elevated under local anesthesia (1:80,000 adrenaline). Access to the alveolar bone was achieved, and decortication cuts were made using a round carbide bur (Buser et al., 1995)(Fig 2). These cuts serve as mechanical or non-infective stimuli that enhance blood perfusion to the healing site and promote the release of growth factors, thereby facilitating normal regeneration processes (Frost, 1983; Shih & Norrdin, 1985).

The prepared L-PRF block was adapted to the surgical site and secured with 3-0 BBS sutures. A periodontal pack (Coe-Pak) was placed(Fig 2), and postoperative instructions were provided. Patient was instructed to return for re-evaluation after 2 weeks, 1 month, 3 months and 4 months(Fig 3).

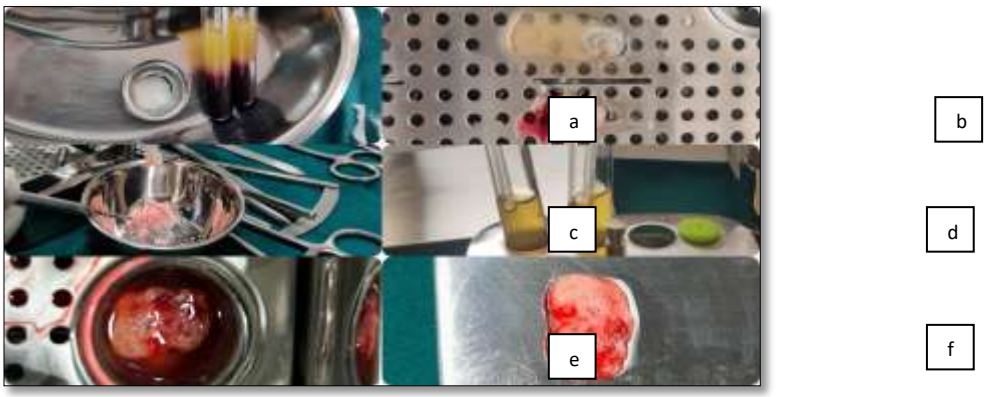

Fig1: Preparation of L-PRF block. **a)** L-PRF clots & Bio-oss **b)** L-PRF membranes **c)** Addition of cut pieces of L-PRF membrane to Bio-oss **d)** Liquid fibrinogen **e)** Addition of liquid fibrinogen **f)** L-PRF block

Fifteen milliliters of blood collected from the patient in plain glass test tubes (Borosil) was centrifuged at 2,700 rpm for 12 minutes to obtain L-PRF membranes. Plasma was obtained by centrifuging at 2,700 rpm for 3 minutes. The compressed L-PRF membranes were then placed in a PRF box. The obtained serum and the cut pieces of compressed L-PRF membrane were mixed with particulate bone graft (Bio-Oss) and gently folded in liquid fibrinogen to form an L-PRF block(Fig 1).

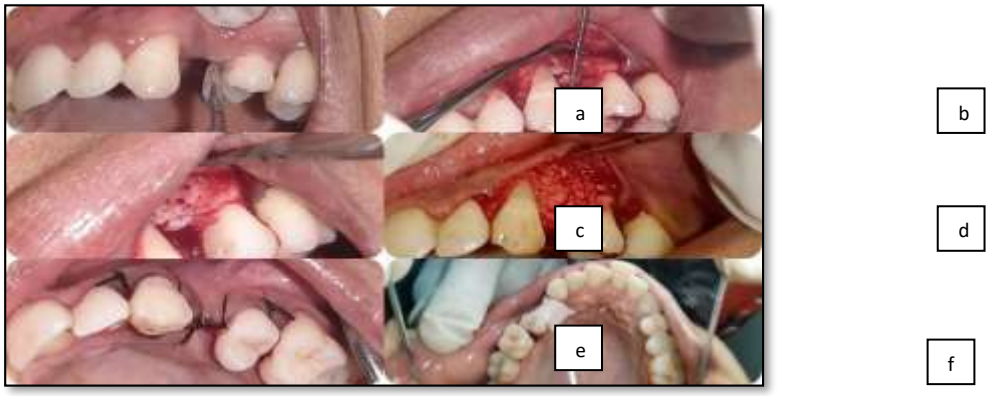

Fig 2: Surgical Procedure. a) supracrestal incision **b)**mucoperiosteal flap elevated & Intraoperative bucco - palatal width 2 mm **c)** Decortication cuts **d)**L-PRF Block in surgical site **e)** flaps approximated using 3-0 BBS suture **f)** periodontal pack placed

Fig3: Comparison between the pre-operative and follow-up images **a)** Pre-operative bucco- palatal view **b)**Pre-operative facial view **c)** 2 weeks post-operative view (resuturing done using 5-0 vicryl at 2 weeks follow up) **d)** Post-operative- 1 month(Palatal view) **e)** Post-operative -1month (Buccal view) **f)** Post-operative - 4months

Fig4: Pre Operative IOPA

Fig5: Post Operative IOPA(4Months)

Discussion: The primary goal of crestal bone augmentation procedures is to ensure sufficient bone volume for safe and predictable dental implant placement, while also achieving adequate bone thickness around the implant. Although the definition of "adequate" bone thickness can vary based on implant characteristics and clinical indications, it is generally recommended to have at least 2mm of bone on the buccal side of the implant to enhance long-term stability and aesthetic outcomes.

Generally, there are no absolute contraindications for ridge augmentation procedures as long as the patient can tolerate a standard oral surgical procedure. However, the availability of adequate bone is crucial for successful implant placement, and bone augmentation procedures are often necessary in cases of bone quantity limitation.

For bone augmentation and other oral implant procedures, certain relative contraindications should be considered, particularly medical conditions that may hinder normal bone healing. For instance, studies have investigated the impact of conditions like experimental diabetes on bone regeneration following guided bone regeneration (GBR) (Retzepi et al., 2010). They found no significant differences in vertical bone regeneration among uncontrolled diabetic, insulin-controlled diabetic, and healthy animal groups. Additionally, smoking has been shown to negatively affect the long-term success of osseointegration, with smokers experiencing higher rates of implant failure and soft tissue inflammation compared to non-smokers (Bain & Moy, 1993; Strietzel et al., 2007; Lindfors et al., 2010).

While patient-related factors like diabetes and smoking are not absolute contraindications for bone augmentation procedures, they should be carefully evaluated during diagnosis and treatment planning. Optimal systemic health of the patient is crucial when bone augmentation procedures are indicated (Reference 1).

The principles guiding bone regenerative therapies should be rooted in sound biological factors that support effective healing processes (Wang & Boyapati, 2006). Molecular events involved in wound healing post-tooth extraction progress through a systematic sequence involving angiogenesis, cell survival, matrix synthesis, and maturation (Lin et al., 2011).

Clinical Significance: In this case report, the combination of autologous bone graft (L-PRF) with commercially available xenograft Bio-Oss, significantly improved horizontal and vertical augmentation, aiming to minimize ridge resorption and correct existing alveolar ridge deficiencies.

The L-PRF block's ease of preparation and its moldable nature to fit defect shapes, coupled with prolonged release of growth factors at the site, have demonstrated effective alveolar bone augmentation postoperatively. These attributes underscore its value as a preferred material for enhancing alveolar bone volume.

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