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Case Report

# Evaluation of Injectable Platelet Rich Fibrin (I-PRF) Versus Hyaluronic Acid with Bovine Derived Xenograft for Alveolar Socket Augmentation Pre-Implant Placement: A Case Report

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## Abstract

Alveolar ridge preservation (ARP) is regenerate and increase the amount of hard and soft tissue at the defect site. Injectable platelets rich fibrin (I-PRF) has the effect of promoting osteoblast migration, adhesion, proliferation, cell differentiation, and bone tissue formation. Hyaluronic (HA) has shown anti-inflammatory, anti-edema and antibacterial effects. A 37-year-old female patient had an ARP, the first socket (2nd premolar) was filled completely with xenograft mixed with hyaluronic acid to form sticky bone. the second socket (1st premolar) was filled also with xenograft bone mixed with I-PRF to form sticky bone, free gingival graft were sutured using 4-0 propylene sutures. Postoperative instructions were given to the patient along with antibiotics and analgesic to minimize the risk of postoperative infection and pain. After 4 months following spontaneous healing of the grafting surgery. In conclusion, both I-PRF and HA added a beneficial value to alveolar ridge augmentation.

**Keywords:** Alveolar Ridge Augmentation; Injectable PRF; Hyaluronic Acid

## Introduction

Alveolar ridge preservation (ARP) is regenerate and increase the amount of hard and soft tissue at the defect site. Graft material promotes bone growth by acting as a three-dimensional matrix that promotes and induces bone repair. Membrane barriers can be used in combination with bone grafts to keep the grafts and blood clots in place and eliminate soft tissues such as epithelium and gingival leather [1-3].

Injectable platelets rich fibrin (I-PRF) has the effect of promoting osteoblast migration, adhesion, proliferation, cell differentiation, and bone tissue formation [4]. Another use of I-PRF in advanced peri-implantitis is an increase in clinical adhesion level (CAL), a significant decrease in probing pocket depth (PPD), and a 3-year follow-up with i-PRF. Showed stable bone levels. A good approach to stimulate healing of hard and soft tissues by the above criteria [5].

Hyaluronic (HA) has shown anti-inflammatory, anti-edema and antibacterial effects. The anti-inflammatory effect may be due to the action of exogenous hyaluronic acid as a scavenger through the excretion of prostaglandins, metalloproteinases, and other bioactive molecules. The anti-edema effect may also be associated with osmotic activity. By accelerating tissue healing properties, it can be used as an adjunct to mechanical treatment. The antibacterial effect is based on bacteriostatic effects, commonly found in oral gingival lesions and periodontal disease. HA plays an important role as a scaffolding material. HA can improve the biological properties of

scaffolds for bone regeneration because the strengths and weaknesses of the composite depend on its composition [6].

## Case Description

A 37-year-old female patient with non-contributory medical history reported to the department with a chief complaint of non-restorable upper left first and second premolars. When the patient was clinically examined there was insufficient crown height making placement of prosthesis difficult with badly decayed remain tooth structure. The patient was then given the option of immediate implant placement and the patient was advised cone beam CT (CBCT). The CBCT showed buccal bone insufficiency to support the implants. After discussing the treatment options with the patient, he agreed for socket preservation with bone regeneration on the buccal wall for implant placement after 4 months. Informed consent was obtained from the patient. A thorough scaling and root planning was performed 2 weeks prior to the surgery. At the time of surgery under local anesthesia, a periotome was used to detach the periodontal fibers and then luxate the tooth. The tooth was then extracted with the help of extraction forceps. Curettage was done in the socket with a spoon excavator and remaining granulation tissue was removed and then the socket was rinsed with sterile saline. Free gingival graft (FGG) was shaped to cover the socket with at least 1mm onto the bone margin to ensure membrane would not collapse in the socket. the first socket (2nd premolar) was filled completely with xenograft mixed with hyaluronic acid to form sticky bone. the second socket (1st premolar) was filled also with xenograft bone mixed with I-PRF to form sticky bone also. FGG were sutured using 4-0 propylene sutures. Postoperative instructions were given to the patient along with antibiotics and analgesic to minimize the risk of postoperative infection and pain. After 4 months following spontaneous healing of the grafting surgery, implants[1]∑ was placed, and allowed for submerged healing. Postoperatively patient was covered by Augmentin[2]∝ 1 gm tablets every 12 hours and Metronidazole[3]∂ 500 mg every eight hours. Ibuprofen[4]• 400mg was prescribed upon need. The patient was instructed to use 0.12% chlorhexidine[5]÷ mouthwash three times daily and instructed to eat soft diet. Sutures were removed 14 days after surgery and the patient was instructed to gently brush teeth with soft brush.

**Figure 1:** Pre clinical bone width 4.5 mm in i-PRF group.

**Figure 2:** Pre clinical bone width 4.5 mm In HA group.

∑Dentium SuperLine II, Gangan-gu, Seoul, South Korea

∝Augmentine, GlaxoSmithKline, United Kingdom.

∂Flagyl, Sanofi, Paris, France.

•Brufen, Abbot, United States.

÷Hexitol Mouth Wash, ADCO, Egypt

**Figure 3:** Post clinical bone width 7.5 mm.

**Figure 4:** Post clinical bone width 6mm.

**Figure 5:** Post extraction site.

**Figure 6:** After socket augmentation.

**Figure 7:** Implant placment.

**Figure 8:** Periapical x ray.

## Results

- Group I: Socket augmentation was performed using I-PRF and mixed with particulate xenograft.
- Group II: Socket augmentation was performed using hyaluronic acid mixed with xenograft. Wound healing was uneventful in all the treated cases.

### i-PRF group

Value measured at baseline (7.56 ± 0.29) was higher than 4 months value (6.38 ± 1.16).

### HA group

Value measured at baseline (7.44 ± 1.12) was higher than 4 months value (6.94 ± 1.18).

## Discussion

In this study Injectable PRF (I-PRF) is a mixed with bone graft forming "steak bone" to make benefit form leukocytes and various growth factors such as, TGF-β1, PDGF, and VEGF, which contribute to cell proliferation, migration, and vascularization needed for tissue regeneration. On the other hand, hyaluronic acid is natural scaffold material which is beneficial for bone regeneration by chemotaxis, enhancing osteoblastic differentiation, bone induction by substances as bone morphogenetic protein-2 (BMP-2) and osteopontin, inhibition of BMP antagonists, anti-inflammatory, anti-edematous and anti-bacterial effects [5,6].

Decrease of clinical bone width was recorded for the three groups after 4 months. The highest decrease of mean values was found in in I-PRF group (-0.88 ± 0.58), followed by HA group (-0.50 ± 0.46), while the lowest decrease was found in the control group (-0.44 ± 1.35). This can be attributed to the rabid resorption rate of I-PRF. It have shown that I-PRF release of PDGF-AA, PDGF-AB, EGF, and IGF-1 only lasts for 10 days. This do not allow for enough time to enhance bone formation [7,8].

## Conclusion

In conclusion, both I-PRF and HA added a beneficial value to alveolar ridge augmentation.

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