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# Comparative Efficacy of Use of Platelet Rich Plasma (PRP) and Platelet Rich Plasma with Alloplastic Graft in Repair of Cystic Lesion

**Swati Sharma**
Senior Lecturer,
Dept. of Orthodontics and Dentofacial Orthopedics,
Eklavya Dental college,
Kotputli,Rajasthan,India

**Abstract**

The optimal management of Periapical defects continues to challenge the clinicians. There are various treatment options available for treating Periapical defects varying in sizes, like non surgical endodontic therapy, surgical endodontic therapy and extraction with surgical therapy. Large lesions may need to be treated with endodontic therapy or extraction combined with a biopsy or enucleation or marsupialisation procedures. The present study compares the efficacy of use of PRP and PRP with hydroxyapetite as alloplastic graft for repair of cystic lesions. The study reports the significant healing after use of PRP along with HA as compared to use of PRP alone.

**Keywords:** Cystic Lesion, Alloplastic Graft, Platelet rich plasma, Growth Factor, Dental Implant.

**Introduction**

Recent development in dental technology has witnessed use of various growth factors in isolation or in combination with various graft materials to accelerate healing process. One such latest practice is use of platelet rich plasma (PRP) which is a concentrate of platelets. Platelets contain important growth factors that, when secreted, are responsible for increasing cell mitosis, increasing collagen production, recruiting other cells to the site of injury, initiating vascular in-growth, and inducing cell differentiation. It is very well documented that application of PRP enhances healing in various procedures such as grafting after sinus lift, periodontal soft and hard tissue radical procedures, ridge augmentation for crown & bridge, and improvement of implant integration. Studies have shown that PRP when used after surgical procedures resulted in significantly faster radiographic maturation and a histomorphometrically denser bone regenerate.

**Objective of the Study**

The combination of tissue engineered product like PRP when incorporated with alloplastic material has both osteoinductive and osteoconductive properties resulting in good amount of healing. The objective of study is to evaluate the efficacy of the platelet rich plasma along with alloplastic material in Periapical defects, hence the study is planned to assess the Osseo regenerative capability and advantages of PRP along with alloplastic material using conventional intraoral Periapical radiographs.

**Review of Literature**

Various tissue engineering techniques have come up recently. One such recent innovation in dentistry is the preparation and use of platelet rich plasma (PRP), which is a concentration of platelets and growth factors found in platelets. Platelets contain important growth factors that, when secreted, are responsible for increasing cell mitosis, increasing collagen production, recruiting other cells to the site of injury, initiating vascular in-growth, and inducing cell differentiation. Using the concept that if a few are good, then a lot may be better, increasing the concentration of platelets at a wound may promote more rapid healing and a denser bone regenerate.

Dean H. Whitman et al (1997), reported the use of Platelet gel as an alternative to fibrin glue. Robert E. Marx et al (1998), in a landmark article demonstrated that PRP contains a high concentration of platelets and the growth factors. Christopher L. Strayhorn et al (1999), conducted an

in-vitro study to evaluate the effects of various growth factors i.e. PDGF, IGF, and BMPs alone or in combination on expression of Osteoblast - associated genes in osteoblast differentiation. The study showed that all these factors in combination enhance the biologic activity of osteoblasts. Richard Shanaman, R. Filstein, Michael J. Danesh Meyer (2001), conducted a case series on localized ridge augmentation using guided tissue regeneration (GBR) and PRP. They reported that augmentation resulted in clinical and radiographic gains in both vertical and horizontal components of the osseous defects, there by facilitating subsequent placement of dental implants.

M. Schlielphake (2002), reported that PRP has a high concentration of growth factors namely Platelet Derived Growth Factor [PDGF], Transforming Growth Factor β [TGF β], Insulin like Growth Factor [IGF] and Vascular Endothelial Growth Factor [VEGF]. BurakDemiralp et al (2004), reported the use of platelet rich plasma in Periapical surgical therapy. GuiseppeIntini (2009) conducted a review of use of PRP in bone reconstruction therapy, which clinicians have employed it in orthopedic and oral surgeries.

**Materials and Methods**

The study was conducted on patients with the Periapical defects. Sample consisted of 6 patients; only PRP was placed in 3 and PRP with hydroxyapatite was placed in 3. All the patients were of the age of 15 yrs and above. The study did not included any patient who is pregnant, have systemic diseases, blood dyscrasiasis, undergoing antiplatelet therapy or had a recent history of myocardial infarction. All patients were diagnosed as having radicular cyst.

**Platelet Rich Plasma**

Platelet Rich Plasma (PRP) is an autologous concentration of human platelets in a small volume of Plasma. PRP has been shown to contain various growth factors including platelet derived growth factor (PDGF), transforming growth factor-β (TGF-β), Insulin like growth factor (IGF), vascular endothelial growth factor (VEGF) and Platelet derived epidermal growth factor (PDEGF). These polypeptide growth factors as well as other bioactive substances are released from platelets upon activation and play a pivotal role in initiating and sustaining wound healing and tissue repair mechanism.

**Hydroxyapetite Bone Graft**

Hydroxyapetite is apatite calcium phosphate [Ca10 (PO4)6 (OH)2]. It is stable, non-toxic and inert material. The porous form of material increases its osteoconduction. Hydroxyapetite is unfortunately brittle and prone to fracture when placed in load bearing areas.

**Surgical procedure**

Atrapezoidal flap or envelope flap was used depending on raising the full thickness mucoperiosteal flap either from buccal or palatal side under LA, and the defect was exposed from all the sides. The defect was curetted and PRP is placed on to the walls and base of the defect and the cavity is totally filled with hydroxyapetite graft. The wound is closed primarily with 3-0 silk interrupted sutures.

The intra oral Periapical radiographs were taken at 1, 3 and 6 month post operatively.

**Results**

Periapical surgery was carried out and the defect was grafted with PRP in 3 cases and PRP with hydroxyapatite in 3 cases material. Osseous regeneration was evaluated using routine intra oral Periapical radiograph (IOPAR), which were taken at the end of first month, third month and sixth month post-operatively. Blending of margins and presence or absence of trabecular bone were the criteria used for evaluation.

At the end of 1st month, there was no blending of margins, and there was mild resorption of hydroxyapetite material among all the subjects. At the end of 3rd month, 6 of them showed good amount of blending of margins and 3 of them had less amount of blending of margins, resorption of hydroxyapetite material was also seen from 3rd month in all the subjects. At the end of 6th month, there was significantly perfect blending of margins in all the subjects and there was increase in the resorption of hydroxyapetite material in all 3 subjects.

The results of blending of margins from 3rd month to 6th month showed, there was gradual increase in blending of margins, and by 6th month there was good amount of resorption of the hydroxyapetite graft material in all 3 subjects.

At the end of 3rd month trabecular bone formation was not clearly but was evident in 3 subjects, and the defect was partially covered by graft material in other 3. At the end of 6 months trabecular formation was not significantly evident in 3 cases with PRP, while in remaining 3 cases complete resorption of graft material was significant.

**Discussion**

There was significant amount of trabecular bone formation and blending of margins which was seen at the end of 6th month and good amount of resorption of graft material was also seen. In this study, combination of PRP and HA significantly showed the enhancement of bone formation.

**Conclusion**

The present study showed earlier trabecular bone formation and good amount of blending of margins by the end of 6th month. This improvement in bone regeneration signifies and highlights the use of PRP and hydroxyapetite as a valid method in healing of bony defects. The study was done with a follow up of 6 months and included only periapical bony defects, but the effect of PRP can really be tried upon larger defects to assess their potential for osseous regeneration with larger sample and longer follow ups.

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