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AN OVERVIEW ON PLATELET RICH PLASMA

Dental Science

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ABSTRACT

Platelet rich plasma (PRP) is a platelet concentrate obtained from autologus whole blood. After its first application by Ferrari et al in 1987, use of PRP has increased in various fields. PRP is a promising alternative to promote healing in dental and oral surgical procedures. Since it is obtained from patients blood risk of immunogenic reactions can be avoided. This article reviews PRP as an emerging treatment modality in oral region .

KEYWORDS

Bone, Platelet Rich Plasma(PRP), Regeneration.

***INTRODUCTION*:**

Platelet Rich Plasma (PRP), is a new approach for tissue regeneration. PRP is an autologous concentrate of platelets suspended in plasma.[1,2] PRP is a source of platelet derived growth factor and transforming growth factor beta 1 and 2. When combined with calcium chloride and thrombin it releases these growth factors. Healing of soft tissue is promoted by PRP, by increasing the collagen content thus increases the wound strength, also the growth factor in PRP regulate cell diffrentiation, chemotaxis and metabolism, thus promoting growth.[3,4] Concept of PRP was started by CJ. Oon and JR. Hobbs in 1975 with continous flow blood separator machine used for selective exchange of packed red blood cells and plasma.[5] It was first applied by Ferrari et al in an open heart surgery, since than it has been used in various fields.[6-8] Application of PRP in oral and maxillofacial surgery was popularized by Marx et al. he showed that PRP contains 338% concentration of platelet and increased concentration of growth factor.[9] PRP is a growth factor enriched with platelet obtained from patients own whole blood by using density gradient centrifugation process. Concentration of platelet in PRP is four times more than that of whole blood. Anitua E reported in 1999, the clinical evidence of the beneficial effect of use of PRP in bone regeneration using plasmaphoresis.[10] PRP is obtained by a process of centrifugation of patients own whole blood. PRP gel has high concentration of platelets.[11] PRP gel also contains native concentration of fibrinogen which allows stabilized coagulation of blood and favours regeneration of bony defects.[12]PRP promotes healing in many surgical procedures such as resective surgical procedures, repair of alveolar cleft, reconstruction of mandible, in placement of osseointegrated implants. Due to its adhesive nature, it facilitates adequate flap adaptation, hemostasis and proper closure.[13] Also PRP use has been proposed recently in the treatment of BRONJ (Bisphosphonate Related Osteonecrosis of Jaw) and avascular necrosis.[14-16]

Properties of PRP: In a small volume of plasma, PRP is an autologous concentration of platelet.[17] Platelet contains Growth factor which provides signals to stem cells which gets attracted towards the site of injury, also they are mitogenic to osteoblast and also stimulate the migration of mesenchymal progenitor cells.[18] Isomers of platelets growth factors are PDGF-AA, PDGF-BB and PDGF-AB. PRP contains Vitronectin, Fibrin and Fibronectin which are adhesive proteins.[19] Thus, when PRP is applied, the concentration of growth factor and all these adhesive proteins will increase at site of bony defect providing a good basis for wound healing with favourable condition leading to faster and effective bone regeneration.[20,21]

Preparation of PRP: [22,23] About 10ml of blood is drawn from patient by venipuncture at the antecubital fossa. The collected blood is transferred to the centrifugation machine. Centrifugation allows the platelet to be suspended in plasma and the erythrocytes and leucocytes gets settled at the bottom of tube. The tube contains about 1 ml of CPDA (Citrate Phosphate Dextrose Adenine). Centrifugation is done for about 10 min 1300rpm. PRP obtained can be mixed with calcium gluconate to form an autologous PRP gel.

Application of PRP:

PRP in socket after tooth extraction: The strategy of PRP for wound healing includes promoting the process of tissue repair, decreasing the time required as well as improving the quality of healing. Alissa et al in 2010 conducted a study on effect of PRP on healing soft tissue and hard tissues of extraction socket. Healing was improved in patients treated with PRP as well as it was noted that post operative complications were more in patients not treated with PRP. On radiographic evaluation dense homogenous trabecular pattern was seen in patients treated with PRP.[24,25]

PRP in soft and hard tissue surgery: In a study by Daif in 2012, effect of PRP on hard tissue regeneration in patient with mandibular fracture was investigated. It was seen that application of PRP directly along the fracture lines enhanced the bone regeneration.[26] Successful results were obtained by Poeschl in 2012, he used PRP in combination with grafting material in the process of maxillary sinus augmentation.[27]

PRP in implant surgery: Anitua et al in 2006, showed that implant osseointegration was enhanced when the implant surface was coated with PRP before.[28] It was reported by Gentile et al in 2010 that efficacy of PRP in terms of post operative patient satisfaction was high [29]

PRP in Bisphosphonate Related Osteonecrosis Of Jaw (BRONJ): BRONJ is a significant complication related to use of bisphosphonates (BPs). These drugs are capable of inhibiting osteoclast mediated bone resorption and also shows anti- angiogenetic activity.This drugs leads to BRONJ, which is an avascular area of bone.

PRP therapy is a new ray of hope to conservatively enhance the bone healing. The presence of growth factors in PRP stimulates the healing of bone similar to that of physiologic healing process. Centiner et al in 2009, reported a case of BRONJ associated with zoledronate . It was treated with PRP. The results seen were positive after 6 months of follow up period.[30,31]

Benefit/Risk of use[32]: With PRP risk of immunogenic reactions , infection, disease transmission is eliminated as patients own blood is used. The use of bovine thrombin in preparation of PRP gel was associated with life threatening coagulopathies but when thrombin is used in small quantity, it does not enter into systemic circulation. Hypothesis regarding over expression of growth factors leading to dysplastic tissues has been postulated but till now no as such cases has been reported. But the use of PRP should be avoided in cases with precancerous condition.

***CONCLUSION*:**

This review suggest that use of PRP has influence bone regeneration, improved soft tissue healing and can be employed in dental surgical procedures. Promising results have been obtained in oral implantology. Since it is free from immunologic reaction PRP can be used as an adjunct in multiple oral surgery procedure. Further research has to be done to explore the applications of PRP.

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