

Platelet rich plasma

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Abstract: Platelet rich plasma is an autologous concentration of eight growth factors PDGF –AA, PDGF –BB, PDGF –AB, Transforming growth factor β 1 and β 2, vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), and insulin like growth factor .

Nowadays PRP is widely used in all the fields of dentistry .This article explains the various potential clinical applications .PRP is prepared from the patient's own blood and there is a less risk of transmission of diseases.

Key Words: PRP, platelets, growth factors, bone regeneration.

I. INTRODUCTION

Platelet rich plasma is new and potentially useful adjunct in oral and maxillofacial bone reconstructive surgery , platelet are essential in the wound healing process initiate coagulation by providing primary haemostasis.(1). They release multiple wound healing growth factors and cytokines, including platelet derived growth factors (PDGF), transforming growth factor (TGF), vascular endothelial factor (VEGF), platelet derived endothelial growth factor (PDEGF), interleukin -1, basic fibroblast growth factor (BFGF) and platelet activating growth factor.(2) Wirthlin (3) defined growth factors as naturally occurring polypeptide molecules , some what like hormones in structure and function but potent local activity rather than systemic effects.

Platelet derived growth factor is glycoprotein of molecular weight approximately 30 kda . It seems to be the first growth factor present in a wound ,and it initiates connective tissue healing including bone regeneration and repair .PDGF accelerates early wound closure via enhanced glycosaminoglycan, hyaluronic acid and fibrinectin deposition.(4) There are about 1200 molecules of PDGF in an individual growth factor (5) Most specific activities of PDGF include mitogenesis ,angiogenesis and macrophage activation .PDGF also, stimulates cell replication of important stem cells for fibroblasts and endothelial cells, stimulates production of fibrinectin and hyaluronic acid and helps bring about wound contraction and remodelling (6).

TGF beta inhibit osteoclasts formation and bone resorption thus favouring bone formation over resorption by different mechanisms (5). The most important functions of TGF β 1 And TGF β chemo taxis and mitogenesis of osteoblasts precursors .They have the ability to stimulate osteoblasts deposition of collagen matrix of wound healing and bone. These factors favour bone formation by enlarging the rate of stem cell proliferation.(7)

PDEGF was discovered by Cohen in 1962 and was first growth factor described . It stimulated epidermal regeneration ,promotes wound healing by stimulating the proliferation of keratinocytes and dermal fibroblast, and enhances the effects and production of other growth factor (8). PDAF (6) has the capacity to induce vascularisation . It stimulates vascular endothelial cells by direct or indirect actions and is involved in the process by which blood vessels invaded vascularised tissues .several growth factors and cytokines up regulate PDAF including IGF -1, TGF α and β ,PDGF ,PDEGF, BFGF and IL- β

II. PREPARATION OF AUTOLOGOUS PLATELET CONCENTRATE / PRP

The preparation of autologous platelet concentrate otherwise known platelet rich plasma Can be accomplished using a gradient density cell separator or by the use of a Centrifugation(9).

On the day of surgery 15 ml of blood was drawn from the patient .Blood was Collected in sterile glass tubes containing 3.8 % sodium citrate as an anti coagulant .

The test tube were gently shaken to facilitate anti coagulation .3 ml was used to obtain a complete blood picture of the patient .The remaining 12 ml was centrifuged following a 2 step procedure . The initial centrifugation process was done at 5000 rpm for 10 minutes. This resulted in separation of 3 basic fractions from least dense to most (10).

1. Platelet poor plasma on the top of the preparation which contains few platelets (11).
2. Middle layer comprising of platelet rich plasma which consists of platelets and white blood cells (buffy coat)

3. The bottom most fraction comprising of red blood corpuscles which also contains Newly synthesized platelets at the top .

PRP is plasma with a concentrated number Of platelets and few white blood cells(12)

Plasma along with the top erythrocyte layer is collected using a 21 gauge spinal needle .A

spinal needle being long is ideally suited for aspiration of the needle and 21 gauge Helps to avoid sequestration of the platelets. This was then transferred to a empty vacutainer tube after removing the anticoagulant within it and centrifuged For 10 minutes at 2000 rpm The reduced speed is aimed at a more precise separation of the PRP from RBC layer .coagulation is achieved by adding bovine thrombin and calcium chloride to produce a gel like consistency.(13,14)

Clinical Applications of PRP in dentistry

1. Effect of PRP on healing the alveolar socket after tooth extraction.

Use of PRP in periodontal defect treatment after extraction of impacted third molars. Gilberto sammartino (15) showed that PRP is effective in inducing and accelerating bone regeneration for the treatment of periodontal defects at the distal root of the mandibular second molar after surgical extraction of a mesioangular deeply impacted third molars . The study was conducted in 18 patients aged 21-26 years where marked reduction in the probing depth and an improvement in the probing attachments in those cases treated with PRP , as well as the formation of new bone tissue in the bony defect .

Even though some studies suggests that the use of PRP in the alveolar socket after Tooth extractions is certainly capable of improve soft tissue healing but there is Insufficient evidence which supports the efficacy of PRP in improving bone regeneration(13,)surgical extraction of a mesioangular deeply impacted third molars . The study was conducted in 18 patients aged 21-26 years , where marked reduction in the probing depth and an improvement in the probing attachments in those cases treated with PRP ,as well as the formation of new bone tissue in the bony defect .even though some studies suggests that the use of PRP in the alveolar socket after tooth extractions is certainly capable of improve soft tissue healing but there is insufficient evidence which supports the efficacy of PRP in improving bone regeneration(13 ,).

III. PRP IN PERIODONTAL SURGERY

PRP plays an important role in the management of furcation defects and reconstruction Of the soft tissues (16) . studies showed that platelet derived growth factor class 3 furcation defects (16).

Root coverage- incorporating the PRP/PPP technique into connective tissue grafting enhance the healing and soft tissue e regeneration .(17).

IV. PRP IN IMPLANTOLOGY.

Sinus lifts augmentation.

PRP also used sinus graft procedure in order to obtain a dense vital in shorter interval Of time when mixed with-bovine thrombin (autologous platelet gel).They can also play an Important role in horizontal and vertical bone augmentation. Bone to implant contact is Increased by coating the implants with PRP.(18).

4. The use of PRP has also been proposed in the management of bisphosphonate-related osteonecrosis of the jaw (BRONJ) 18)

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