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THE USE OF PLATLET RICH PLASMA IN THE ORAL SURGERY

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ABSTRACT:

The aim of the review is to show the possibilities autogenes platlet rich plasma to be used in oral surgery. Review of the methods for preparation, quality and the main clinical applications of the platlet rich plasma is made. It can be used widely in the oral surgery and can improve clinical results.

Key words:platlet rich plasma,growth factors

One of the last achievements in dentistry is the use of platlet rich plasma /PRP/ for the improvement of reparation and regeneration of the soft and hard tissues after different surgical procedures. Platlet rich plasma is a concentrated platlets in a small volume of plasma /8/. There are other terms besides PRP such as plasma very rich in platlets /PVRP/; autologus platlet gel /APG/; platlet concentrates /PC/ the latter according to Appel T et al /1/ is most accurate from hematologic point of view. Marx R /8/consider that platlet rich plasma is the most appropriate one for this substance.

During platlet degranulation many biologic active substances are released which participate in the primary hemostasis and help the following reparation and regeneration of the soft and hard tissues. The most important of the are: serotonin, cateholamines, fibrinogen, factor V, factor VIII / von Willebrand/, thromboxan A2, calcium etc. Many growth factor are also very important: Platlet-derived growth factor /PDGF/; Transforming growth factor-β /TGF- β/; Vascular endothelial growth factor /VEGF/; Interleucin-1/IL-1/; Basic Fibroblast Growth Factor /BFGF/; Insuline-like Growth Factor /IGF/. In the platlet rich plasma there are also small quantities of immune cells and plasma as well /2,8,11/.

Growth factors belong to the family of the biologic mediators which have different receptors in the case of cell and tissue reparation including cell proliferation and differentiation /6,7/. Despite this adding in the wound around bone and bone- replacing materials of growth factors in high concentrations is helping the new bone formation /7,8,11/.

Healing of the wounds hystollogicaly proceeds generally in three phases and is supported by cell and humoral factors. The first phase is the so called catabolic period, followed by proliferative phase approximately 14 days long. The third phase is the phase of reparation and reorganization, which may last from days to months. The proliferative phase is characterized with plenty of cells and blood vessels. The intensive cell metabolism provides the necessary for the cell differentiation, cell migration and tissue regeneration matrix. Platlet derived growth factors mainly have effect upon the proliferation phase /5,13/. They help angiogenesis and activate macrophage, fibroblast and preosteoblast proliferation through hemotaxis and activation of their mitotic activity / 3,13/.

The application of PRP in combination with bone and bone-replacing materials /especially autogenes/ is with high activity for transforming the surrounded cells in bone cells and as a result of the increasing integrity of the graft/7,13/.

The use of platlet rich plasma is well known in medical practice and science and is used in different surgical procedures and in oral surgery as well. In 1998 Marx et al/7/ use for the first time autogenes platlet rich plasma in oral surgery and give a blueprint for its production. Today several modifications of the way PRP is produced but they all are essentially the same. PRP may be produced in the labs and outside them. For dentistry it is very important that PRP can be produced outside the labs.

PRP is produced from the blood of the patient using different methods for platlet concentration through centrifugation and cell separation /13/. The aim is to achieve from 300 to 500 % augmentation of the platlet concentration in certain plasma volume./8/

The production of the PRP may be done in a specialized automatic centrifuges /Smart PReP^{tm}- Harwest Technologies Corp. USA/ or standart ones /Labofuge 300-Laboratory Products Germany/. 60 ml of whole blood is drawn by venopuncture and anticoagulant is added, the mixture is centrifuge for n10 minutes with 2400 rpm. Then plasma is separated from the sediment mainly build from erythrocytes. The separated plasma is then centrifuge again for 15 minutes with 3600 rpm without interruption of the process. Finally the plasma is very carefully separated from the newly formed sediment which is finally PRP. The separated plasma can be called platlet poor plasma /PPP/.

For the activation of the platlet rich plasma before its use liofilisated human or bovine thrombin and 10 % solution of calcium dichloride are added in a ratio 1:5. The

activation of the PRP and its addition to different bone and bone replacing materials lead to formation of plastic /wax-like/ mass, which help the application. Some authors consider that it is not necessary to add to PRP other agents if calcium-rich materials are used, such as β-TCF /6/.

Sonnleitner et al/12/ describe the use of PRP as a membrane structure. Mixing of the PRP with thrombin or blood from the wound of the patient in a ratio approximately 1:1 allows to gel-lake structure to be formed- fibrin membrane. With this fibrin membrane fenestrations and bone defects can be covered as other barrier membranes which can be or not resorbed. For the same purpose other authors suggest platlet poor plasma to be used.

There are many possibilities for platlet rich plasma to be used in oral surgery. Part of the studies are in animal models, but there are also many studies in humans. Adding the platlet rich plasma to various bone and bone replacing materials in order to stimulate the formation of a new bone is recommended for augmentation the bottom of the maxillar sinuses /6,9,15/. It can also be used for immediate filling the bone defects after tooth extraction and bone augmentation in order to increase the possibility for incorporation of dental implants. With or without guided tissue regeneration /GRT/ PRP can be used for filing intrabone defects and bone pockets /4,11,14/. Oyama et al /10/ recommends the use of PRP in addition to autogenus bone in the plastic surgery of fissures of the alveolar bone and the palate. Pertnagro P./11/ suggests PRP to be added to GTR and subepithelial connective tissue graft /SCTG/ in the treatment of the recession of teeth roots. PRP can be used also in surgical procedures for closing oaroantral and oronasal communications, sealing the sinus mucosa /Schneiderian membrane/, lateralization of the vessels and nerves subepithelial connective tissue graft of the mandibular and also in haemophilic patients.

In conclusion we can say that the possibility for quick and easy preparation of PRP gives the possibility its big biopotential to be used for the improvement of the clinical results in a lot of surgical procedures in oral surgery.

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