Platelet Rich Fibrin in Socket Preservation

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Abstract

With the advancement in dentistry, there are different ways of treatment such as restoration, surgical procedures as well as aesthetic treatments socket healing after extraction comprises of hard tissue as well as soft tissue reconstruction with changes which is maximum dimensionally during the initial three months. One of the major challenges in clinical science is the development of bioactive surgical additives to improve the pace of the process of healing and inflammation control. Platelet-rich fibrin (PRF) exists in this context as a safe and adequate substitute with less risk and favourable outcomes. The methodology of use of PRF, concentration on its planning advantages and drawbacks of use in clinical applications are summarized in the following review. Platelet-rich fibrin (PRF) was developed in France first as a beneficial substitute to platelet-rich plasma to overcome its limitations.

Keywords: *Platelet-rich fibrin, socket healing, dentistry*

Introduction

There are diverse types of restorative, aesthetic and surgical procedures in today's world of advanced dentistry. Tooth extraction is a common dental procedure in the manner of decay, complicated fractures, infections and development of orthodontic spaces. Physiological healing of the post-extraction socket requires a complex pro -stop migration and maturation of bone cells leading to selective bone resorption and application. The most important factor is the preservation during routine extraction process of the residual ridge failure of which frequently leads to the compromise of potential implant placement and future recovery.[1] Post extraction cases results in the residual alveolar ridge having a dimensionally less in both vertical as well as horizontal axis. Several techniques are used to avoid loss of bone post-extraction and repetitive post-extraction placement of implant which includes preservation of socket with grafts and placement of implants immediately.[2]

Clinical practitioners have a range of graft materials to select from. Some of which need a longer period to heal when introduced even a little amount of new bone into the site of the graft. Biomaterial socket preservation was suggested and platelet-rich plasma with growth factors and platelet-rich fibrin (PRF) is used. A second generation of autologous growth factors that is PRF promotes healing and id suggested to be correlated with an efficient and early formation of the percentage of bone substance and volume of bone. A Leukocyte platelet concentrate thick fibrin matrix called PRF can be easily made with autogenous and non-coagulated blood when centrifuged.[3]

History: In 1970s platelets regenerative capacity was discovered. It stated that they produce growth factors culpable for raising the development of collagen, improvement of blood vessels, mitosis of a cell, mobilization of certain cells to the injury site and cell division activation. For in vivo tissue engineering utilization some of the new advances in the usage of concentrates of platelet in oral surgery are:

PRP - Platelet-rich plasma

PRF – Platelet-rich fibrin

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As bioactive surgical agents used locally to promote healing of wound are a combined suspension of growth factor present in platelet called platelet concentrates. The usage of platelet-rich plasma in oral surgery was first promoted by Whitman et al [3] in 1997 with important benefits as osteoprogenitor cells in bone graft and host bone was stimulated by it. But, the development of antibodies to factor V, XI and thrombin was a possibility though, as bovine thrombin was used to treat PRP which may induce coagulopathies that may hazard life. On the other side, by Choukroun et al [4] primarily in oral and maxillofacial surgery,PRF was used in 2001 and is generally known to be a modern type of platelet concentrate. It has many benefits over PRP as it consists of an autologous fibrin matrix [5] including simplex processing and doesnot involve chemical stimulation of the blood so, it is purely autologous.[1-5]

Drawbacks of PRP: Several drawbacks of PRP was reported soon after its success in the initial years of its use. The procedure of preparation was very lengthy and hence to prevent clotting anticoagulants such as $CaCl_2$ or bovine thrombin was used. these materials are known for the inhibition of wound healing. Due to lengthy procedures, the oral and maxillofacial surgeons started avoiding the use of PRP. Another limitation was that it was liquid. So bone grafts of various origin were required to be combined with PRP. In 2006 Choukroun and his fellow workers tried to develop a PRP preparation simplifying method and elimination of xenofactors which lead to the development of second-generation platelet-derived material called platelet-rich fibrin (PRF).[6]

Types of PRF: Recently to get different ratios within the fibrin matrix different types of techniques using blood concentrates have been developed. According to a recent study, particular cell types are differently distributed based on the centrifugal force.

A. A modification was done in PRF by Choukroun to get – A –PRF (leucocyte enriched, advance type) and I – PRF (injectable type)

B. Pure platelet-rich fibrin (P-PRF) – It is a solid material and has no leukocyte

C. Titanium PRF(T-PRF) – It has a superiorly organised fibrin network with continuous integrity

PRFand its different uses in dentistry

- Sinus lift
- Socket preservation
- Guided bone and tissue regeneration
- Regeneration of periodontium
- Regenerative endodontics

Disadvantage of PRF: Proper handling of blood while its collection and its transfer to the centrifuge is the important factor for the success of PRF. Some patient might refuse to the procedure as it requires an invasive procedure to collect the blood sample. The resultant amount is very less as it is autologous blood.[7]

Advantages of PRF: PRF helps in soft tissue repair that protects the surgical site and accelerates wound healing, when bone graft is mixed to PRF it acts as a biological connector. Osteoprogenitor cells and stem cells are attracted to the centre of the graft. In the elderly patients where regeneration of bine is required PRF helps in implant rehabilitation. Tissue regeneration is stimulated by PRF as it contains the framework of natural fibrins containing growth factors. It is easy and simple in technique for preparation with the help of centrifugation and is easy for all clinicians to access. [8]

Preparation of PRF: The appropriate blood quantity is drawn from the patient into the test tube from the antecubital vein by venous puncture which is held without an anticoagulant. The centrifugal machine is used to centrifuge the blood at 3000rpm for 10minutes. There is a development of fibrin clot of platelets situated in the middle of the channel. It is mainly concentrated between the bottom red layer of the blood cells and top layer of the acellular plasma with the help of a sterilised tweezer the formed clot is separated from the test tube, then the placement of the PRF clot is done on the PRF box grid and with the compressor and lid, it is covered. This leads to the formation of autogenous fibrin membrane.[9]

Role of prf in healing of wound

(1) Ambushment of blood cells circulating in the blood.

(2) Neoangiogenesis

(3) At the site of wound healing, there is a continuous release of growth factor.

(4) Osteoblast and Fibroblast generation.

(5) Promotes collagen production.

(6) Accompanies wound analysis.

(7) Adherence of fibrin mechanically.

(8) Supervision of immunity.

Clinical Procedure: Buccal and lingual/palatal infiltration of anaesthesia of Lidocaine Hcl 2% with epinephrine 1:100000 is given. Extraction is done with least injury and avoiding the raising of flap. The dilation of the socket is done by the help of the periotomesby placing them aroundthe root. The removal of the tooth is done using the forcepswith the placement of PRF the extraction site is treated immediately followed by application of pressure and suturing with figure 8 . Post extraction instruction is given. [10]

Discussion

Number of Histological studies and experiments have been carried out on tooth socket healing but radiological studies are very less . A platelet concentrate assembled on a single fibrin membrane containing all the desirable healing elements is called as PRF. Platelet act as a source of many growth factors which play an important role in healing of hard tissue and soft tissue thus platelet preparations are done. Neoangiogenesis is promoted by human osteoblasts which is due to PRF.[7]PRF acts as a matrix to promote the healing of wound edges when used as a fibrin bandage in a membrane shape. The preparation of the chairside is quite inexpensive, easy and the process is simplified and fast. When the socket is filled with PRF. Neovasculization occurs and epithelial covering forms. Healing processes of extraction socket occurs concurrently with an amount of latency that contains both hard and soft tissue. The clot retracts and breaks down towards the end of the 1st week and is replaced by granulation tissue. The higher part of the alveolar bone ridge is covered by granulation tissue and the soft tissue cut edges are covered by epithelium. PRF which is formed naturally has a complex and dense structure that has both leukocytes and platelets.[8-10]

Conclusion

The amount of bone regeneration which is seen with the use of PRF is more appreciable as compared to the cases treated without PRF use. For the preservation of socket and rehabilitation,PRF is an inexpensive material and can be easily used. Minimal invasion, patient discomfort as well as expertise of the operator is required to conduct this procedure when compared to other processes that include bone grafting.

Ethical Permission: Not Required

Conflict of Interests: None

Funding: None

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