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PERSPECTIVE

Platelet-rich fibrin is the first-line treatment option for periodontal regeneration

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Platelets are involved in the process of wound healing by blood clot formation and with regenerative potential via growth factors released from alpha granules. Platelet concentrates are blood extracts after centrifugation for the concentration of growth factors found in platelets.[1] Platelet concentrates can act as bioactive surgical additives that are applied locally to promote wound healing. Platelet-rich plasma is one of the first generation of platelet concentrate techniques with anticoagulants to avoid coagulation during preparation. After two steps of centrifugation, the product requires the addition of bovine thrombin and calcium chloride to achieve artificial clinical polymerization in the natural state. The disadvantages of platelet-rich plasma are the expense, extended production time, risk of disease transmission, and weak fibrin network formation leading to inconsistent outcome of clinical application.

Platelet-rich fibrin (PRF), described by Choukroun et al,[2] was firstly introduced into clinical application in oral maxillofacial and implant surgery in Southern Europe. PRF is a new generation of platelet concentrate techniques that allow one to obtain fibrin membranes enriched with platelets and growth factors, starting from an anticoagulant-free blood harvest. Preparation of PRF is the simplest and most inexpensive procedure for the formation of autologous fibrin matrix. Briefly, blood samples are obtained without an anticoagulant in 10-mL glass or glass-coated plastic tubes and immediately centrifuged at 3000 rpm for 12 minutes.[2] Three layers are obtained after centrifugation: red blood corpuscles at the bottom of the tube; platelet-poor plasma on the top; and a fibrin clot formed in the middle part of the tube. The fibrin clot is easily separated from the lower part of the centrifuged blood. PRF membrane can be obtained by gently pressing with sterile dry gauze condensed or modeled on a sterile metal plate.

The success of this technique depends entirely on the time gap from blood collection to its transfer for centrifugation, and immediate centrifugation before initiation of the clotting cascade is absolutely essential. Rapid blood collection and handling are the keys to achieving a clinically a usable PRF clot. Compared with other platelet concentrate techniques, PRF is easier to prepare and does not require chemical manipulation of the blood, which makes it strictly an autologous preparation. There are some advantages to the use of PRF: (1) it is a simple and open-access technique; (2) it minimizes autologous blood manipulation; (3) it uses a membrane or grafting material; (4) it delivers autologous multiple growth factors; (5) it is safe without disease transmission; and (6) it has a low cost.

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PRF is a complex architecture of strong fibrin matrix as a resorbable membrane with growth factors released after at least 1 week.[3] Therefore, PRF can act as a reservoir of many growth factors that are known to play a crucial role in hard and soft tissue repair processes. Previously, we have reported that PRF has a strong positive effect on the proliferation of gingival fibroblasts, periodontal ligament fibroblasts, and osteoblasts, but retards epithelial cell proliferation *in vitro*.[4] This cell-type-specific manner makes PRF beneficial to periodontal regeneration. In addition, activation of phosphorylated extracellular signal-regulated protein kinase, osteoprotegerin, and alkaline phosphatase expression by PRF suggests the pivots for new periodontal attachment formation.[5] Furthermore, antimicrobial effects of PRF have also been described.[6] The regeneration potential and antibacterial effects of PRF may be useful in periodontal surgery.

Previously, we have reported the use of PRF as the sole grafting material for periodontal intrabony defects and furcations. At 6 months after surgery, the outcomes showed that the periodontal osseous defects achieved probing depth reduction, clinical attachment gain, and postoperative radiographic density increase.[7] A retrospective study of the application of PRF with synthetic bone graft for periodontal infrabony defects also revealed pocket reduction and clinical attachment gain with minor gingival recession.[5] The defects were filled with bone-like dense tissue in grafted teeth after 1 year of follow-up. Recently, the clinical application of PRF with synthetic bone graft was first used for the treatment of perio—endo combined intrabony defect with the achievement of probing depth reduction, clinical attachment gain, increase of gingival thickness, and increase of periapical bone density over a 6-month period.[8] Moreover, a split-mouth randomized clinical study demonstrated that PRF allowed treatment of gingival recession with adequate wound healing, highly predictable root coverage, and increased thickness of gingival tissue.[9] Recently, a systematic review and meta-analysis of the regenerative potential of PRF during periodontal surgery demonstrated the beneficial effect of PRF in intrabony defects, furcation invasion, and periodontal plastic surgery.[10]

In conclusion, PRF prepared from the patient's own blood can decrease or eliminate the risk of disease transmission. In addition, *in vitro* and *in vivo* studies have demonstrated safe and favorable effects on hard and soft tissue healing in periodontal surgery. Current evidence-based dentistry shows that PRF can be routinely used in periodontal regenerative surgery, with good biological effects and satisfactory clinical results under correct manipulation.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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