

Platelet-rich fibrin

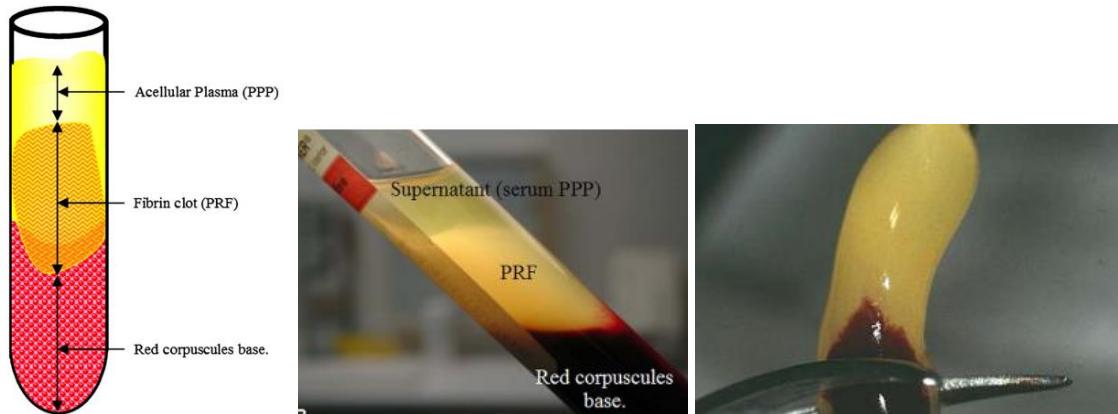
Introduction

- Platelet rich plasma (PRP) first generation platelet concentrate
 - o From centrifuged blood
 - o Has a weak fibrin network, requires activation by thrombin and calcium
 - o Growth factors in PRP show a beneficial effect on wound healing leading to an increased use of platelet concentrates in the last decade
 - o Complications: coagulopathies, antibodies to factor V and XI, tedious preparation
- Platelet rich fibrin (PRF) is a second generation platelet concentrate
- First description of PRF was in 2000 by Choukroun
- In 2006 gained attention in field of dental research
- Improvement over PRP because it removed the need for anticoagulants and clotting activators
- Biological potential to improve wound healing
- Capacity to successfully regenerate soft and hard tissues
 - o Enhancing angiogenesis, tissue formation during healing
- Uses include: third molar surgery, alveolar ridge preservation after extractions, sinus lifts, repair of alveolar clefts, dental implants, surgical treatment of MRONJ, oroantral communications, TMJ derangements
- Three key parameters:
 - o Presence of platelets and growth factors
 - o Leucocytes and cytokines which contribute to immune regulation
 - o Fibrin matrix
- Fibrin architecture differentiates PRF from other platelet concentrates such as platelet rich plasma
 - o Responsible for the slow release of growth factors
 - o Acts as a scaffold for cell migration and differentiation
- PRF reservoir for growth factors which can be released over 10-14 days
 - o TGF- β
 - o VEGF
 - o PDGF
 - Store in platelet α granules
 - Essential regulators for collagen and mesenchymal cell migration
- Combination of host cells, strong fibrin matrix and growth factors result in faster wound healing

Technique

- Does not require anticoagulant, thrombin or any other gelling agent
- Blood sample is taken in a 10mL tube

- Immediately centrifuge at 3000rpm for 10 minutes
- A fibrin clot develops between the red corpuscles at the bottom and the acellular plasma at the top
- Platelets are trapped within the fibrin mesh
- Success depends on speed of collection and transfer to centrifuge
 - o If there is a delay the fibrin will polymerize in a diffuse way resulting in a small blood clot with poor consistency



Uses of PRF in oral surgery procedures

- Objective of systematic review to determine in which surgical procedure PRF has a beneficial effect

Mandibular Third Molar Surgery

- Decreased prevalence of alveolar osteitis during the first week
 - o Based on 226 extractions (113 test, 113 control)
 - o OR 0.33
- Some studies reported a reduction in post-operative pain
 - o Greatest reduction seen on the 3rd day
 - o Heterogeneity in studies included in evaluation
- Three out of six articles demonstrated a reduction in post-operative swelling
 - o Beneficial overall effect was noted after 3 days
- Studies that evaluated the effects of PRF on bone healing using radiographs noted PRF was significantly better at promoting bone regeneration
- Studies evaluating bone healing through scintigraphy demonstrated no difference in osteoblastic activity

Sinus Lift Procedure

- No significant difference in the percentage of new bone formation when PRF was added
- No significantly significant beneficial effects on soft tissue and wound healing

- Results may be due to a limited number of patients evaluated in the metanalysis
- Through histological analysis of sinus lift procedures, PRF reduces healing time favouring faster bone cicatrisation
- Using PRF as a membrane to cover lateral maxillary sinus window over conventional collagen membrane
 - o Lower cost
 - o Easy obtainment
 - o Total biocompatibility
- Can be used to cover schneiderian membrane perforations

Alveolar Ridge Preservation

- PRF alone or combined with graft material improves the preservation of the alveolar ridge and results in less bone resorption
 - o Maintained bone width
- Accelerated soft tissue healing in the first 4 weeks
- No significant difference in bone density
- Proangiogenic cytokines and growth factors in PRF help to enhance bone preservation
- Positive effect of PRF decreases when a more invasive surgery is performed

Dental Implant and Cleft Patients

- Increased mean percentage of newly formed bone when PRF is used for cleft repair
 - o Fibrin matrix may aid the bone formation after surgery
- Beneficial effect of PRF in reducing peri-implant marginal bone resorption following dental extraction with immediate implant placement
- Use of PRF increases implant stability (based on ISQ values) during initial healing period

Conclusion

- PRF improves wound healing when used in surgical procedures
- Promising material to enhance alveolar cleft reconstruction and reduce peri-implant marginal bone resorption
 - o Currently limited evidence available
- Most consistent indications
 - o Preserve alveolar dimensions after extraction
 - o Reduce incidence of dry socket after mandibular 3rd molar extractions

References:

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