

Use of R.T.R. and PRF as filling material in post extraction sockets

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Introduction

Currently, the great majority of the extractions are followed by the immediate use of an implant. In some cases the bone volume is not enough to get the desired primary stability, in that case the clinician will need a first surgery where he would win the bone volume required for that implant, and then a second surgery for the final placement of the implant¹.

To obtain the best results possible, the use of a material that guides the bone regeneration is necessary and β -tricalcium phosphate has proven a great efficacy in helping and maintaining the space for the bone regeneration². In addition to

this, the use of platelet rich fibrin (PRF), a second generation platelet concentrate, that acts as a bioscaffold and has multiple growth factors, can accelerate the process of regeneration³.

The characteristics of R.T.R. are its porosity, that helps in the formation of stronger clots, no systemic toxicity and its resorbability that promotes new bone formation in 3 - 6 months. In synergy with this, PRF thanks to its growth factors promotes the new bone formation and, as an optimized clot, helps to get a faster regeneration of the extraction socket and to have a more predictable outcome^{4,5}.

Case report

A 59 year-old woman, systemically healthy and under periodontal treatment, requires the extraction of the left central incisor (2.1) and left lateral incisor (2.2) to be rehabilitated with osseointegrated implants in a second surgery after the alveolar preservation surgery. The lateral incisor presents a radiolucent lesion around the root and no presence of vestibular wall in 2.1. The surgery

was explained to the patient with the risks and benefits and an informed consent was signed. Local anesthesia was administered to the patient. The teeth were extracted with a forceps taking care to preserve the alveolar walls. After the extraction, a full mucoperiosteal flap was elevated which allowed to confirm the great loss of alveolar bone.



Fig. 1: Extraction of 2.1



Fig. 2: Extraction of 2.2



Fig. 3: The two alveolar sockets



Fig. 4: The extracted dental pieces

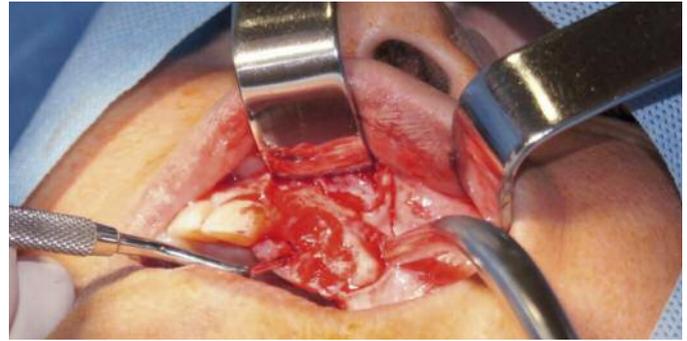


Fig. 5: Mucoperiosteal flap elevation

Two blood tubes of 9 ml without anticoagulant were obtained from the patient's ante cubital vein for the production of the PRF. The PRF was produced following Choukroun protocol (3000 rpm by 10 min)^{6, 7} and then compressed into two membranes^{8, 9}. The exudate of the compression was collected with a syringe to be applied over the bone graft. One of them was cut and mixed with R.T.R. fragments to be used as the bone graft and the other one was

used as a membrane^{6, 7}.

R.T.R. was fragmented to get a better adaptation to the defects, and once mixed with the PRF membrane, it was placed in the defects. When the graft was ready the exudate was then applied to it. When suturing, the membrane was applied with a pocket technique to ensure its intimate contact with the bone graft¹⁰. The flap was closed with simple stitches and in first intention.

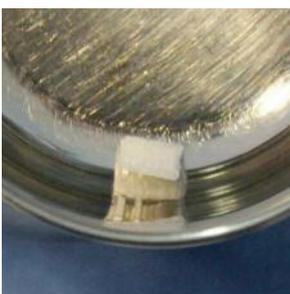


Fig. 6: R.T.R. cone

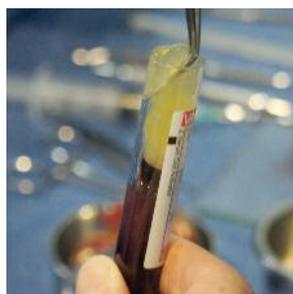


Fig. 7: PRF clot



Fig. 8: PRF clot before mixing with the graft



Fig. 9: PRF membrane mixed with the graft



Fig. 10: Application of the graft



Fig. 11: Graft placed



Fig. 11: Graft placed



Fig. 12: Application of the exudate



Fig. 13: Suture



Fig. 14: PRF membrane



Fig. 15: Immediate post-operative situation



Fig. 16: X-ray pre-operative



Fig. 17: X-ray 1 week post-operative

Discussion

The use of platelet concentrates has become popular during the last 10 years, but among them, one of the simplest and cheapest form has raised as one of the best options, the PRF. As a cheap and free access platelet concentrate, its homogenous bibliography supports its good results as an adjuvant in multiple surgeries like sinus lifts, intrabony defect fillings and of course bone grafting^{6, 7}. Although PRF acts as a bioscaffold, it lacks a good resistance and resorbs in around 28 days, thus the use of a material that sustains bone regeneration is necessary, and that material is R.T.R.

Beta-Tricalcium Phosphate has a proven biocompatibility, osteoconductivity and resorbability. As it resorbs, R.T.R. releases calcium and phosphate ions which help in the neo formation of the bone¹¹.

The combination of two materials with not known local or systemic toxicity and that synergize in the formation of bone should reduce the time needed to place the implants. The bone graft that best suits the PRF characteristics still needs further and deep study, but R.T.R. seems to perfectly fit all the characteristics to maximize the bone regeneration.



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References

1. Ten Heggeler, J. M. a G., Slot, D. E. & Van der Weijden, G. a. Effect of socket preservation therapies following tooth extraction in non-molar regions in humans: a systematic review. *Clin. Oral Implants Res.* 22, 779–88 (2011).
2. Geurs, N. et al. Using growth factors in human extraction sockets: a histologic and histomorphometric evaluation of short-term healing. *Int. J. Oral Maxillofac. Implants* 29, 485–96 (2014).
3. Kang, Y.-H. et al. Platelet-rich fibrin is a Bioscaffold and reservoir of growth factors for tissue regeneration. *Tissue Eng. Part A* 17, 349–59 (2011).
4. Dohan Ehrenfest, D. M., Del Corso, M., Diss, A., Mouhyi, J. & Charrier, J.-B. Three-dimensional architecture and cell composition of a Choukroun's platelet-rich fibrin clot and membrane. *J. Periodontol.* 81, 546–55 (2010).
5. Choukroun, J. et al. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part IV: clinical effects on tissue healing. *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 101, e56–60 (2006).
6. Del Corso, M. et al. Current Knowledge and Perspectives for the Use of Platelet-Rich Plasma (PRP) and Platelet-Rich Fibrin (PRF) in Oral and Maxillofacial Surgery Part 1: Periodontal and Dentoalveolar Surgery. *Curr. Pharm. Biotechnol.* 13, 1207–1230 (2012).
7. Simonpieri, A. et al. Current Knowledge and Perspectives for the Use of Platelet-Rich Plasma (PRP) and Platelet-Rich Fibrin (PRF) in Oral and Maxillofacial Surgery Part 2 : Bone Graft , Implant and Reconstructive Surgery. 1231–1256 (2012).
8. Dohan Ehrenfest, D. M. How to optimize the preparation of leukocyte- and platelet-rich fibrin (L-PRF, Choukroun's technique) clots and membranes: introducing the PRF Box. *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 110, 275–8; author reply 278–80 (2010).
9. Kobayashi, M. et al. A proposed protocol for the standardized preparation of PRF membranes for clinical use. *Biologicals* 40, 323–9 (2012).
10. Dohan Ehrenfest, D. M., Doglioli, P., de Peppo, G. M., Del Corso, M. & Charrier, J.-B. Choukroun's platelet-rich fibrin (PRF) stimulates in vitro proliferation and differentiation of human oral bone mesenchymal stem cell in a dose-dependent way. *Arch. Oral Biol.* 55, 185–94 (2010).
11. Observations, H., Brkovic, B. M. B. & Prasad, H. S. Pratique Simple Preservation of a Maxillary Extraction Socket Using Beta-tricalcium Phosphate with Type I Collagen : Preliminary Clinical and. 74, 523–528 (2008).