

Regenerative Endodontic Procedures Using Blood Clot in Conjunction with Autologous PRF in Necrotic Mature Teeth with Apical Periodontitis in Dogs (An Experimental Histological Study)

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INTRODUCTION

The scope of REPs is now extending to include treatment of necrotic mature permanent teeth with closed apices. (1) Platelet rich fibrin (PRF) is a natural fibrin-based scaffold that is prepared from patient's own blood without any biochemical additives. It is rich in platelets, growth factors and important cytokines, which can fasten the regeneration process. Hence, PRF could be used as a scaffold in regenerative endodontics. (2) The aim of this study is to evaluate histologically the nature of the regenerated tissues following REPs in necrotic mature permanent teeth, in dogs using two different scaffolds: Induced blood clot (BC) and PRF together with BC.

METHODOLOGY

Pulpal necrosis was induced by accessing dogs' incisors and leaving them exposed to the oral cavity for 3 weeks to develop apical periodontitis, which is confirmed radiographically. Under rubber dam isolation, root canals were instrumented using ProTaper Next system up to size X₃ (#30) under constant irrigation with 1.5% NaOCl. Calcium hydroxide was then placed as intracanal medicament for 2 weeks.

In **BC group**, apical foramen was furtherly enlarged using hand K-files till #30 and a sterile pre-curved K-file #25 was inserted beyond the canal to induce intracanal bleeding. (Fig. 1A) While in **PRF+BC group**, after induction of bleeding, paper points were used to dry the excess blood so that the blood filled the apical third only and PRF small pieces were condensed inside the root canal space. (Fig.1B)

Three mm of MTA was placed in the cervical third of the root canals followed by resin-modified glass ionomer as a coronal restoration. Three months later, dogs were euthanized and bone blocks containing incisors were processed for histological evaluation

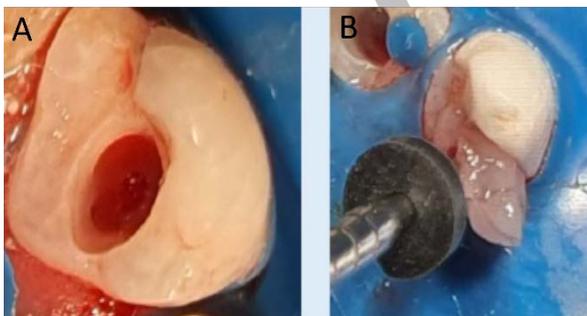


Figure (1): showing A: intracanal bleeding
B: PRF being packed inside the canal

RESULTS AND DISCUSSION

In **BC group**, the regenerated tissues contain more mineralized tissues (Bone-like) that are embedded in a vascular dense fibrous tissue (Periodontal ligament-like).

(Fig. 2A&B). While in **PRF+BC group**, the regenerated tissues are well-vascularized loose fibrous tissues that look more closely to the structure of normal pulp but without odontoblasts. It also showed a higher degree of inflammation. (Fig. 2C&D) Mineralized tissue was found to be formed on the canal walls in **both groups**.

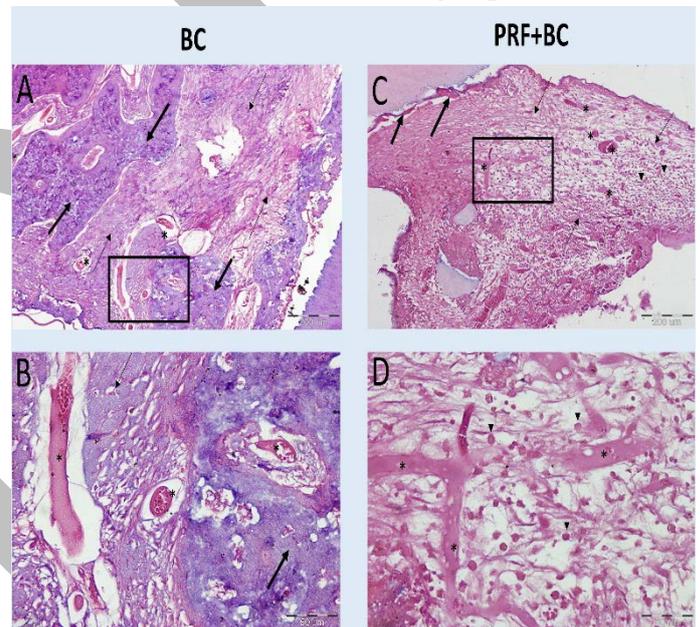


Figure (2): showing LM of regenerated tissues in BC group (A&B) and PRF+BC (C&D). A: shows the newly formed bone-like tissues (thick arrows) surrounded by areas of dense fibrous tissue (thin arrows), Blood vessels can be also seen (asterisks). B: higher magnification of previous inset. C: shows loose fibrous tissue (thin arrows) containing numerous inflammatory cells (arrow heads) and numerous blood vessels (asterisks) through the regenerated tissues. Cementum-like tissue can be seen in contact with the canal wall (Thick arrows). D: higher magnification of the pervious inset. H&E (A&C X100, B&D X400)

CONCLUSION

Based on our preliminary results, it appears that using PRF in conjunction with blood clot in REPs regenerate tissues that looks, histologically, more closely to the structure of the normal pulp, but it lacks odontoblasts.

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