

Session: OS097 Biofilms: novel methods in treatment & prevention

**Category: 9c. Preclinical biofilm studies**

23 April 2017, 16:48 - 16:58  
OS0501

**Regenerative endodontic procedures with the use chitosan scaffolds in immature dog teeth with apical periodontitis**

Paulo Palma\*<sup>1</sup>, João Carlos Ramos<sup>1</sup>, João Filipe Martins<sup>1</sup>, Anibal Diogenes<sup>2</sup>, Maria Helena Figueiredo<sup>1</sup>, Catarina Chaves<sup>3</sup>, Carlos Viegas<sup>4</sup>, João Miguel Santos<sup>1</sup>

<sup>1</sup>*University of Coimbra; Faculty of Medicine; Department of Dentistry*

<sup>2</sup>*University of Texas Health Science Center; Department of Endodontics*

<sup>3</sup>*Centro Hospitalar e Universitário de Coimbra; Clinical Pathology Department*

<sup>4</sup>*University of Trás-Os-Montes e Alto Douro; Department of Veterinary Sciences*

**Background:** During the development of permanent teeth, the occurrence of caries, trauma or anatomic alterations is quite common and can jeopardize the pulp tissue and impair the pulp-dentin complex physiology and as consequence the normal root development. Premature loss of a functional pulp in immature teeth leads to the arrest of root dentin formation, resulting in a thin and functionally compromised canal wall. Regenerative endodontic procedures (REPs) have emerged such as revascularization and revitalization of pulp tissue in immature necrotic teeth with apical periodontitis, to allow the reinforcement of root canal walls and sometimes the continuation of their development, thus opening new therapeutic possibilities in this field. To evaluate histologically the newly formed tissues following REPs in dogs using either blood clot or two different formulations of a chitosan hydrogel as scaffolds after canal disinfection.

**Material/methods:** Apical periodontitis were induced by inoculating immature teeth with oral plaque in 4 Beagle dogs. Teeth (n=96) were divided into two control (n=20) and four test groups (n=76) according to the treatment protocol: 1-MTA apical plug, or regenerative procedures using different scaffolds: 2-blood clot; 3-sodium hyaluronate:chitosan(HA:CS); and 4-pectin:chitosan(P:CS). All root canals were disinfected with 2.5% sodium hypochlorite and a triple antibiotic paste intracanal

medicament prior to evoked bleeding, clot formation or scaffold placement. Eleven weeks' post-treatment, the animals were sacrificed and the jaw blocks harvested for histologic processing and morphological and histomorphometric analysis and statistical analysis (Kruskal-Wallis and Mann-Whitney U tests) were performed with a level of significance set at  $P < 0,05$ .

**Results:** The lumen of the root canals were completely filled with MTA with evidence of a mineralized apical bridge between root canal walls in 83% of the samples in group 1. A vital vascularized tissue was found in 2, 3 and 4. For these groups, apical closure happened in 66.7% of the treatments and root growth was detected more often as an increase in thickness (85.6%) than in length(45.6%). The greatest amount of mineralized tissue inside the canal was observed in group 2, with significant differences compared to 3( $P=0.006$ ), and 4 ( $P=0.025$ ). Further histological evaluation revealed the presence of apical papilla.

**Conclusions:** The addition of the scaffolds to the blood in regenerative procedures did not improve the formation of new mineralized tissues along the root canal walls and the histologic evidence of the regeneration of a pulp-dentin complex. Despite of the scaffolds used, REPs allowed the continued development of root walls with presence of bone-like tissue, cementum and periodontal ligament often observed into the canal space. In spite of the theoretical possibility of a more effective regeneration with different scaffolds (group 3, 4), our results sustain that better results were found with the induction, formation and stabilization of a blood clot.