The European Journal of Orthodontics, Volume 18, Issue 5: October 1996.

Healing of the root surface-associated periodontium: an immunohistochemical study of orthodontic root resorption in man

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ABSTRACT

The purpose of the present investigation was to study resorption and regeneration of periodontal tissues incident to orthodontic tooth movement, in particular cells resorbing the root surface and the subsequent regeneration of the periodontal epithelial network and forming reparative cementum. The study was carried out using a select number of immunohistochemical markers on extracted human teeth which had been treated orthodontically. The most striking finding in the resorbing areas was the presence of what appeared to be two populations of KP 1^+ mononuclear cells located at a distance of 50-100 [mu]m from the root surface and multinucleated cells in resorption lacunae in close contact with the root surface. KP 1^+ has previously not been reported for odontoclasts. The mononuclear KP 1^+ cells in the periodontal ligament may represent either precursors to odontoclasts or phagocytic scavenger cells of the macrophage lineage. The subsequent healing of the resorption lacunae was characterized by re-establishment of nervous, vascular and epithelial tissues as evidenced by S-100^+ filamentous delicate structures, factor $VIII^+$ vessels and cytokeratin$^+$ clusters of cells, respectively. However, cytokeratin$^+$ single cells in close contact with the unresorbed cementum did not re-appear within the healing period. Although the present results are not quantitative in nature, cementoblasts located in the vicinity of resorption lacunae, especially healing ones, appeared to show an up-regulation of epidermal growth factor (EGF) receptors. It may be suggested the intense positive staining for EGF receptors may be an expression of an auto- or paracrine stimulatory pathway increasing the rate of reparative cementum formation.

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