

Survival of Root Canal Pulp Tissue after Pulpitis

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Abstract

The aim of this study was to demonstrate the possibility if infected and inflamed pulp tissue survived after the clinical treatment with local application of an antibacterial drug mixture. A total of 48 third molars, consisted with 15 teeth of pulpitis with the clinical symptoms of spontaneous pain, 24 teeth of pulpitis with visible pulp exposure, and 9 teeth diagnosed as necrotic pulp because of vacant coronal pulp-chambers, was included in this study. A combination of 3 antibacterial drugs, *i.e.*, metronidazole, ciprofloxacin, and minocycline (3Mix), was further mixed with macrogol (M) and propylene glycol (P) and used to disinfect pulps of 47 teeth, while the remaining one pulp was not treated as a control. 3Mix-MP was placed onto the dentin floor of cavities, or orifice of root canal, then sealed by glass-ionomer cement and further reinforced by composite resin inlay. Seven days to 19 months after treatment, the teeth were extracted under the informed consents. They were observed by micro-computed tomography (CT) before decalcification with 10% ethylenediamine tetraacetic acid (EDTA) solution (pH 7.0). Immunohistochemistry against Nestin and protein gene product (PGP) 9.5 was performed in addition to Hematoxylin and Eosin, Azan and Giemsa staining. Micro-CT revealed that, in all cases, carious lesions extended to the pulps. Clinical outcomes at the time of extraction were good in all cases without any additional clinical symptoms. Histopathologically, in all cases, damages of pulpal tissue, such as inflammatory cell infiltration and destruction of pulp tissue including the loss of odontoblast layers at the exposed areas, were observed as the consequence of pulpitis. However, in all the 38 cases treated as pulpitis, both of coronal and radicular pulp-tissue survived and retained/restored the pulpal functions demonstrated by positive immunochemical reactions of Nestin and PGP 9.5. In addition, among 9 cases diagnosed as necrotic pulp, 5 cases demonstrated that root canal pulp-tissue remained at apical one-third of root canals with a few inflammatory cells, and Nestin and PGP 9.5 were positive in the remaining pulp-tissue, while in the remaining 4 cases, root canal chambers were entirely vacant with few scattered cells, if any. Disinfection of infected and inflamed pulp-tissue using 3Mix-MP might result in the discontinuance of pulp destruction and the survival of pulp tissue. The present study clearly demonstrated that pulpal tissue survived and retained/restored pulpal functions after LSTR 3Mix-MP treatment even though the cases had once infected and inflamed with spontaneous pain, pulp exposure or partial necrosis of pulp tissue. It should be noted that, when inflamed pulp tissue remained in root canals even the coronal pulp was destructed, it was worth first to disinfect the root canal pulps using 3Mix-MP without removal of them, because the radicular pulp tissue could survive and restored the pulpal functions even after once they had infected and inflamed.

Keywords: disinfection of pulps, histopathology of pulpitis and the treatment, infected dental pulp, LSTR 3Mix-MP

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