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Expression of VEGF and M-CSF levels in bone remodeling during tooth movement with laser therapy histological and Immunohistochemical Study

Ahmed Bolad

Al Neelain University, Sudan

Background: Vascular endothelial growth factor (VEGF) induces proliferation of endothelial cells, stimulates angiogenesis, and increases vascular permeability, but information about its role in bone remodeling therapy is limited. The aim of this study is to determine Evaluation of the expression of macrophage colony-stimulating factor (M-CSF) to assessment for dental tissue response includes (periodontal ligament, cementum, alveolar bone) to application of LLLT and VEGF in orthodontic treatment in experimental rabbits.

Materials & Methods: A total sixty healthy male New Zealand - white rabbits of 22-24 weeks of age were used. Divided randomly into four groups: control group, experimental group with VEGF, experimental group LLLT and experimental combination group (VEGF + LLLT). These four groups received orthodontic appliance include only the mandibular central incisors (MCIs), and these teeth were moved distally for 21 days by using pushing coil spring that will be delivered a total constant amount of light continuous orthodontic force about 100gm (50gm for each tooth). Application day for treatment will be at (0, 7th, 14th, 18th) of total experimental period. Each five rabbits for each study groups were sacrificed at the end of each periods (1st week, 2nd week, 3rd week) with inhalation anesthesia. Radiographical assessment method was performed first, then, histopathological examination for bone formation and resorption was performed at the pressure and tension sides of the coronal level with immunohistochemical based assessment for macrophage colony-stimulating factor (M-CSF)

Results: It shows on the bases of clinical findings that there is significant difference in the percentage of tooth separation between the control and the experimental groups, and the combination group records the highest value.

The Radiographic, histological and immunohistochemical findings support this, as the radiographic findings show the same result of clinical finding. Histological reports for numbers of osteoblast, osteoclast and blood vessels revealed a high record for combination group followed by laser and then VEGF group.

Conclusion: The exogenous application of VEGF and LLL therapy can increase the rate and percentage of orthodontic tooth movement by stimulating PDL remodeling and increasing alveolar bone formation.

aaabolad@hotmail.com