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Effects of local rosuvastatin/hyaluronan hydrogel on post-orthodontic relapse reduction in rabbits: Histological and immunohistochemical study

Abstract

One of the most novel approaches to reducing post-orthodontic relapse is the local delivery of osteogenic agents by drug carriers. This study evaluated the effect of a local injection of rosuvastatin (RSV) carried by hyaluronan hydrogel (HAH) on alveolar bone regeneration. On the first day of retention after orthodontic movement of the rabbit's lower incisors, 15 albino rabbits were injected locally with 200 μ l of phosphate-buffered saline, and 15 rabbits were injected with 200 μ l of RSV/HAH. Histological analysis of alveolar bone remodeling by measuring osteoblast, osteoclast, and blood vessel counts, as immunohistochemical analysis for Bone Alkaline Phosphatase (BAP) and Tartrate Resistant Acid Phosphatase 5b (TRAP 5b) expressions at the injection site at 0, 10, and 21-day intervals at coronal and apical levels was done. Statistical analysis done by SPSS using $P \leq 0.05$ was considered significant. The RSV/HAH group showed a significant increase in osteoblast count and BAP expression on day 0 (score 3+) and day 10 (score 2+), a significant reduction in osteoclast counts, and TRAP 5b expression on day 0 (score 1+) and day 10 (score 2+) with a significant increase in blood vessel count on day 10 both coronally and apically. In conclusion, local injection of RSV/HAH has promising effects on alveolar bone regeneration by increasing BAP expression, osteoblast, and blood vessel counts and reducing TRAP 5 b expression and osteoclast count.