



Local Rosuvastatin Loaded by Thiolated Hyaluronan Hydrogel for Post orthodontic Relapse Reduction. In Vitro Preparation and In Vivo



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Abstract:

BACKGROUND: Relapse after orthodontic treatment represent an unresolved orthodontic problem. Local injection of osteogenic agents loaded by drug carrier serves as a key strategy for developing materials that may efficiently affect bone remodeling and reduce orthodontic relapse. **Aims:** The objective of this study was in vitro loading, preparation, and characterization of Rosuvastatin on injectable thiolated hyaluronan hydrogel with assessment of its clinical effect. **Material and Method:** Rosuvastatin (RSV) was loaded into injectable thiolated hyaluronan hydrogel (HAH) with in vitro assessment of the resultant material by evaluation of ¹H-NMR, FTIR and SEM, injectability, gelation behavior, swelling behavior and release kinetics of RSV. In vivo evaluation was done by local injection of experimental materials in New Zealand male rabbits' model after orthodontic treatment. The rabbits were randomly divided into two groups: group I (control) injected with 200 µl of phosphate-buffered saline (PBS), group II injected with 200 µl of RSV/HAH, the effect on relapse was assessed by measurement of relapse amount and percentage after orthodontic treatment. Statistical analysis was performed by independent sample t-test ($P < 0.05$ was considered significant). **Results:** Loading RSV into HAH was confirmed by ¹H-NMR and FTIR. RSV/HAH showed a significant reduction in relapse amount (1.70mm, 1.78mm) and relapse percentage (53.4%, 55.9%) compared to control which was (2.65mm, 2.79mm) and (85.2%, 89.7%) on days 17 and 21 respectively. **Conclusions:** HAH was successfully prepared for local RSV delivery. RSV/HAH has the potential to enhance post orthodontic teeth stability and could have the ability to reduce relapse after local injection.