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The influence of Nano Chitosan as Final Irrigation on Smear Layer Removal and Cleaning of Dentinal Tubules (In Vitro Study)

Abstract

Aim: This study aims to evaluate the effectiveness of newly chitosan nanoparticles (CNPs) irrigations and compare them with other golden standard irrigations in the removal of smear layer.

Materials and Methods: A total of Fifty-four single-straight rooted human mandibular premolar teeth were obtained after being freshly extracted and utilized. All the teeth were decoronated to leave a 12-mm root length. Each tooth was accessed and the root canal was prepared using Pro-Taper universal rotary files to size F3. During instrumentation and between each file, the canal was irrigated with 2 ml of 2.5% NaOCl followed by 5ml of distilled water to flush it. Samples were distributed into six groups. Each group contained 9 samples and received a final wash for 3 minutes. Subsequently, each sample was longitudinally sectioned and observed under SEM. Finally, collected data was analyzed statistically.

Results: Statistically significant difference was found among the groups in all three thirds ($p < 0.01$) and no significant difference between 0.2% and 0.5% Nano Chitosan ($p > 0.05$). Chitosan nanoparticles (CNPs) were highly efficient as chelating solutions apically, but equally effective in coronal and middle thirds to EDTA. The efficiency of NaOCl at cervical and middle levels was superior to CNPs. 2% CHX and distilled water had the least efficient on removing the smear layer at all levels.

Conclusion: Newly irrigation chitosan nanoparticles appear to be highly efficient in smear layer removal as final washing.