

Micro-computed Tomographic Evaluation of the Shaping Ability of 3 Reciprocating Single-File Nickel-Titanium Systems on Single- and Double-Curved Root Canals

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Abstract

Introduction

We performed a micro-computed tomographic assessment of the preparation of moderately single- and double-curved root canals using 3 single-file reciprocating nickel-titanium systems: S1 Plus Standard (Sendoline, Täby, Sweden), WaveOne Gold Primary (Dentsply Sirona, Ballaigues, Switzerland), and Reciproc R25 (VDW, Munich, Germany).

Methods

Seventy-five moderately curved mandibular molars with 2 separate mesial root canals were assigned to 3 experimental groups ($n = 25$) (ie, S1 Plus Standard, WaveOne Gold Primary, and Reciproc 25 groups) by forming matched triples according to curvature (15° – 40°), radius (≤ 18 mm), and type of curvature (single or double curved). Teeth were scanned before and after root canal preparation with a resolution of $10.5 \mu\text{m}$ using micro-computed tomographic imaging (Bruker SkyScan 1272; Bruker microCT, Kontich, Belgium). The following parameters were assessed: changes in root canal volume and surface area, percentage of unshaped canal walls, structure model index, canal transportation, and centering ratio. Data were analyzed using 2- and 3-way analysis of variance with Tukey and Scheffé post hoc tests (significance level of 5%).

Results

No significant differences among groups were observed concerning all parameters. The type of curvature had no significant effect on all tested parameters. Within all experimental groups, canal transportation increased significantly from the apical to the coronal region, of which the majority was directed toward the furcational area.

Conclusions

Preparation with the 3 nickel-titanium systems did not result in significantly different dimensional changes, and there was no significant effect of the type of curvature on all tested parameters.