Geometric Analysis of Root Canals Prepared by Four Rotary NiTi Shaping Systems

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Abstract

Introduction: A great number of nickel-titanium (NiTi) rotary systems with non cutting tips, different cross sections, superior resistance to torsional fracture, varying tapers, and manufacturing method have been introduced to the market. The purpose of this study was to evaluate and compare the effect of 4 rotary NiTi preparation systems, Revo-S (RS; Micro-Mega, Besancon Cedex, France), Twisted file (TF; SybronEndo, Amersfoort, The Netherlands), ProFile GT Series X (GTX; Dentsply, Tulsa Dental Specialties, Tulsa, OK), and Pro- Taper (PT; Dentsply Maillefer, Ballaigues, Switzerland), on volumetric changes and transportation of curved root canals.
Methods: Forty mesiobuccal canals of mandibular molars with an angle of curvature ranging from 25_ to 40_ were divided according to the instrument used in canal preparation into 4 groups of 10 samples each: group RS, group TF, group GTX, and group PT. Canals were scanned using an i-CAT CBCT scanner (Imaging Science International, Hatfield, PA) before and after preparation to evaluate the volumetric changes. Root canal transportation and centering ratio were evaluated at 1.3, 2.6, 5.2, and 7.8 mm from the apex. The significance level was set at P#.05.
Results: The PT system removed a significantly higher amount of dentin than the other systems (P = .025). At the 1.3-mm level, there was no significant difference in canal transportation and centering ratio among the groups. However, at the other levels, TF maintained the original canal curvature recording significantly the least degree of canal transportation as well as the highest mean centering ratio.
Conclusions: The TF system showed superior shaping ability in curved canals. Revo-S and GTX were better than ProTaper regarding both canal transportation and centering ability.

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