SEM evaluation of canal wall dentine following use of M_{two}® and ProTaper® NiTi rotary instruments

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Aim: To compare in-vitro root canal walls after instrumentation with two different rotary NiTi instruments using a scanning electron microscopy (SEM). The hypothesis was that no difference should be observable between the 2 experimental groups in terms of debris on canal walls and surface morphology.

Methodology: Twenty-four single-rooted human teeth were selected. Two types of NiTi instruments were used: M_{two}® and ProTaper®. For both groups irrigation was performed after each instrument change with 5 % NaOCl, 3 % H_2O_2 and 17 % EDTA solutions. Three different areas (coronal, middle and apical thirds) of the root canal were evaluated using SEM. The canal wall of each sample was assessed and compared using a predefined scale of four parameters, namely, smear layer, pulpal debris, inorganic dentine debris and surface profile. Data was analysed statistically using the Kruskal-Wallis-test (ANOVA).

Results: For both groups a statistically significant difference ($P < 0.01$) was found between the apical third and the middle and coronal thirds. No difference was observed between instrumentation groups. In the apical third, canal walls were often contaminated by inorganic debris and by smear-layer. Furthermore, the surface profile was affected by uninstrumented regions, comprising dentine depressions and grooves in which predentine was still visible.

Conclusions: Both instruments produced a clean and debris-free dentine surface in the coronal and middle thirds, but were unable to produce a dentine surface free from smear layer and debris in the apical third. The presence of deep grooves and depressions on the dentine walls in the apical third may well be explained by the lack of complete contact between the instruments and the canal walls.