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Penetration of root canal sealers in dentinal tubuli

The aim of this study was to test the penetration ability of pulp canal sealers into dentinal tubuli of hand- or a new non- instrumentation method (NIT)- obturated root canals after hand preparation or NIT- cleansing of the root canals. Eighty-eight deep-frozen molars were divided into eight comparable groups. The roots of four groups were instrumented with the balanced force technique. The remaining teeth were not instrumented but were connected to the reduced- pressure device (NIT) to perfuse the root canal system with 2.5% NaOCl under alternating pressure fields. The canals of the hand-instrumented groups were obturated using cold lateral condensation with gutta- percha and one of four different sealers (AH Plus, AH 26, Apexit and Pulp Canal Sealer EWT). The NIT- treated teeth were obturated with the vacuum- obturation method (NIT) using the same four sealers. Sealers were made fluorescent with Rhodamine B. The penetration depth of sealers into dentinal tubuli was measured using a confocal laser-scanning microscope. The NIT-canals showed a statistically significant increase ($P < 0.01$) in sealer penetration compared with those obturated by lateral condensation. In canals cleansed and obturated by NIT, the mean penetration depth of all sealers was $1173\ \mu\text{m}$ in the coronal region of the root, $830\ \mu\text{m}$ in the middle part and $188\ \mu\text{m}$ in the apical region. In the hand-canals the mean penetration depth was $867\ \mu\text{m}$ in the coronal region, $418\ \mu\text{m}$ in the middle part, and $82\ \mu\text{m}$ in the apical region. The penetration depths were highly dependent on the sealer used. It was concluded that the NIT-method sealed the root canal system very tight, which is a prerequisite for long-term success.