

Influence of plug penetration depth on the apical extrusion of root canal sealer

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I. Objectives

The purpose of this study was to evaluate the the influence of plug penetration depth on the apical extrusion of root canal sealer during root canal obturation by Continuous Wave of Condensation Technique.

II. Materials and Methods

Forty extracted human teeth with single canal and its apical foramen size of 15 were divided into four groups of ten teeth each. Root canal preparation was done with #2 to #4 Gate Glidden drills and ProFile® 0.06 and 0.04 tapers. Canal patency was established with #10 K-file. Canals were irrigated with 2.52% NaOCL and 15% EDTA solutions. After drying, canals of three groups were filled with Continuous Wave of Condensation Technique with different depth of plugger penetration depth of 3, 5, and 7 mm from the apex. Canals of one group were filled with cold lateral compaction technique as a control.

To collect the extruded sealer beyond apex, teeth were placed in a hole in a rubber top and an empty 1.5 cc microcentrifuge tube was attached to it as a collecting container. The operating field was covered with aluminium foil to simulate the clinical situations.

Canals were filled with nonstandardized master gutta-percha cones of medium size and 0.02 ml of Sealapex®. System B™ and four sizes of Buchanan's pluggers were used as heat source. The rest of the canal space was filled with the use of Obtura II™. The weight of the collected sealer was measured with an electronic balance. Data was analysed with one-way ANOVA and Duncan's Multiple Range Test.

III. Results

The mean weight of apically extruded root canal sealers were as follows: 2.0 ± 1.2 mg in 3 mm-plugger penetration depth group ; 1.8 ± 0.8 mg in the 5 mm-plugger penetration group, 0.7 ± 0.7 mg in 7 mm-plugger penetration depth group, while no sealer was extruded in the lateral compaction group. Therefore, 3 mm- and 5 mm-plugger penetration depth groups showed significantly more extrusion of root canal sealer than 7 mm-plugger penetration group and lateral compaction group ($p < 0.05$).

IV. Conclusions

The result of this study demonstrates that deeper plugger penetration depths causes more extrusion of root canal sealer in root canal obturation by Continuous Wave of Condensation Technique. Therefore, special caution is needed when plugger penetration depth is 3 mm from the apex in Continuous Wave of Condensation Technique to minimize the amount of sealer extrusion beyond apex.