The Effect of Smear Layer on Push-Out Bond Strength to Dentin of Bioceramic Sealer
(in vitro study)

A Thesis
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Abstract

The objectives of the canal space obturation are to prevent leakage from the oral cavity and the periradicular tissues into the root canal system and to seal any microorganisms that could not be entirely removed during cleaning and shaping procedures. In addition, sealers should demonstrate adhesive properties to dentin, decreasing the chance of endodontic treatment failure. Increased adhesive properties to dentin may lead to greater strength of the restored tooth, which may provide greater resistance to tooth fracture and clinical longevity of an endodontically treated tooth.

The aim of this study was to evaluate the shear bond strength of Bioceramic iRoot SP sealer, AH plus sealer and Apexit plus sealer in absence or presence of smear layer using push out bond strength test.

Sixty straight single roots of the mandibular premolars were selected for this study. All canals were instrumented using ProTaper rotary instruments to achieve tapered canal walls, instrumentation was done with copious irrigation of 5.25% sodium hypochlorite. Roots were randomly divided into three groups according to the type of sealer used (twenty teeth for each group):

Group A: Apexit plus + gutta percha .

Group B: AH plus sealer + gutta percha .

Group C: iRoot SP sealer + gutta percha .

Then groups were subdivided according to types of final irrigation into two subgroups. Groups (A_1, B_1, and C_1) were irrigated with 5 ml of 5.25% NaOCl for 1 minute while Groups (A_2, B_2, and C_2), the smear layer was removed with 5 ml of 17% EDTA for 1 minute. All groups were rinsed with distilled water and then obturated with cold lateral condensation technique, the roots then stored in moist environment at 37°C for one week.

The roots were embedded in clear acrylic resin and three horizontal sections were prepared at a thickness of 1 mm ±0.1 in the apical, middle and coronal parts of each root. The test specimens were subjected to the push-out test method using a Universal Test Machine that carried 1-mm, 0.5- mm and 0.3-mm plungers for coronal, middle and apical specimens, respectively. The loading speed was 0.5 mm/ min. The computer showed the higher bond force before dislodgment of the filling material. These forces were divided by the surface area to obtain the bond strength in MPa.

The results showed that the bond strengths of iRoot SP and AH Plus were significantly higher than those of Apexit plus, but there was no significant difference between the bond strength of iRoot SP and AH Plus.

In terms of root segments, the bond strengths in the middle specimens and the apical specimens were higher compared with the bond strengths in the coronal specimens.

The presence or absence of smear layer did not significantly affect the bond strength of Bioceramic filling materials.