

Dentinal tubule penetration of AH Plus, BC Sealer and a novel tricalcium silicate sealer: a confocal laser scanning microscopy study

Roula El Hachem¹ & Issam Khalil¹ & Guy Le Brun² & Fabrice Pellen² & Bernard Le Jeune² & Maha Daou³ & Nada El Osta⁴ & Alfred Naaman¹ & Marie Abboud⁵

Abstract

Objectives The aim of this in vitro study was to assess the dentinal tubule penetration of three different sealers, AH Plus, BC Sealer and a novel tricalcium silicate sealer (NTS).

Materials and methods Ninety-six human maxillary central incisors were divided into three experimental groups (n = 32) and were filled with gutta-percha using a single-cone technique in conjunction with one of the three sealers: AH Plus, BC Sealer or NTS. The roots in each group were cross-sectioned at 1 and 5 mm from the root apex, and the surfaces were examined under confocal laser scanning microscopy (CLSM). The sealer penetration depths were measured at their maximum depths and at four circumferential depths (12, 3, 6 and 9 o'clock) and were evaluated using ImageJ software (ImageJ, NIH).

Results The maximum and mean penetration depths were significantly higher at 5 mm compared to 1 mm from the apex in the AH Plus ($p < 0.001$), BC Sealer ($p < 0.001$) and NTS groups ($p < 0.001$). No significant difference was observed between the groups at 1 mm for both parameters. The maximum and mean penetration depths were significantly lower at 5 mm for AH Plus compared with the other two groups ($p = 0.012$).

Conclusions Within the study limitations, the BC Sealer and NTS demonstrated better tubule penetration results than the AH Plus sealer.

Clinical relevance Although no study has confirmed a relationship between the penetration depth of root canal sealers and the prevention of apical periodontitis, dentinal tubule sealer penetration may improve obturation quality.

Keywords AHPlus . BC Sealer . NTS . Tubule penetration . Confocal laser scanning microscopy

Roula El Hachem
roula.hachem@gmail.com

¹ Faculty of Dentistry, Department of Endodontics, Saint Joseph University, Beirut, Lebanon

² Laboratoire OPTIMAG, University of Bretagne Occidentale, 6 Avenue Le Gorgeu, C.S. 93837, 29238 Brest Cedex 3, France

³ Faculty of Dentistry, Dental Materials Laboratory, Saint Joseph University, Beirut, Lebanon

⁴ Faculty of Dentistry, Department of Prosthodontics, Saint Joseph University, Beirut, Lebanon

⁵ Physics Department, UR TVA, Faculty of Science, Saint Joseph University, B.P. 11-514-Riad El Solh, Beirut 1107 2050, Lebanon

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.