

Original Article

In Vitro Apatite-Forming Ability of Different Root Canal Sealers
(A Comparative Study)

Abstract

Aim: Hydroxyapatite (HA) formation ability of endodontic sealers is considered an index of their bioactivity and plays a significant role in hard-tissue inductivity and elevating the sealing ability of the root canal system. This study evaluated and compared *in vitro* the apatite-forming ability of endodontic sealers after immersion in phosphate buffer saline (PBS). **Methods:** Eighty sealer specimens, 20 samples for each sealer (GuttaFlow2, GuttaFlow Bioseal, ProRoot mineral trioxide aggregate [MTA], and MTA Fillapex), measuring 1.0 ± 0.1 mm in thickness and 20 ± 0.1 mm in diameter, were prepared, then incubated at 37°C and 95% relative humidity for three times their setting time to ensure complete setting. The disc samples were de-molded, and 10 sealer discs of each sealer were immersed for 28 days in PBS, while the other discs were not immersed. Morphological and elemental analyses for the surface precipitate of each sealer's disc were analyzed with a field emission scanning electron microscope with energy-dispersive X-ray spectroscopy (FESEM). In addition, X-ray diffraction (XRD) and Raman spectroscopy analyses were used to assess the HA precipitate. **Results:** The FESEM revealed a superficial layer of apatite spherulites coated on (GuttaFlow Bioseal, ProRoot MTA, and MTA Fillapex) sealers after 28 days of immersion in PBS. The calcium to phosphorus (Ca/P) ratio of the coating indicated the formation of HA deposits which is higher for ProRoot MTA followed by MTA Fillapex and then by GuttaFlow Bioseal. Apatite deposits were confirmed by XRD through their characteristic peaks and Raman spectra through their band at 960 cm^{-1} . **Conclusions:** This *in vitro* research approves the excellent bioactivity of ProRoot MTA. In addition, both MTA Fillapex and GuttaFlow Bioseal sealer have bioactive ability