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Biopolymer Composites with Bio minerals Added and Bioresorbable Calcium Phosphate Loaded

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Introduction

Additionally, the Hitachi SU-3500's variable pressure scanning electron microscope eliminated the need to dehydrate the specimen and apply an extremely thin coating of an electrically conducting metal in order to enable SEM observation, thereby minimizing the damage caused by preparation steps. Another drawback of digital software-based interfacial gap measurement is the difficulty of determining an overall value for each root section. Shokouhinejad, et al. suggested method for overcoming this in this study was taken. The average of the maximum marginal gaps in each root section slice was used to calculate the overall value that described the interfacial adaptation between the obturation material and the dentinal walls. According to a recent study, approximately calcium silicate cements are used by 51.7% of dentists worldwide for specific endodontic procedures like pulp cupping and retrograde obturations. Several materials with a calcium silicate base are currently available for endodontic clinical use. Additionally, a novel CS sealer has recently been developed to replace the conventional AH plus epoxy resin-based sealer. The new AHPB only contains 5%-15% tricalcium silicate, whereas the conventional CS materials contain high percentages of calcium silicate in their chemical composition. As stated in the introduction, the purpose of this study was to compare and contrast the biological, physicochemical, and mechanical properties of two novel CS sealers with those of a standard epoxy resin-based sealer in vitro. Between the studied criteria and the tested materials, significant differences and important characteristics were discovered. Therefore, the study's null hypothesis that there would be no difference between modern CS sealers and traditional resin-based sealers must be rejected.

Discussion

This variation could be the result of our study's different approach to determining the pH of the sealers we tested. When replacing the storage solution in contact with the specimens, any change in the quantity of media, the type of media (water or PBS), the shape and dimensions of the specimens, the contact conditions before and after the setting time, the temperature, or the experimental design could indeed affect the final results of the experiment. However, it is essential to point out that the bioactivity of CS materials may be affected by an alkaline pH and the amount of Ca^{2+} released into the environment. As a result, additional research is required to assess the novel CS materials tested in this study's liberation of Ca^{2+} and their capacity to precipitate apatite-like crystals. A material's bioactivity, as previously defined, is a phenomenon by which a material modulates biological activity or a material designed to induce a specific biological activity.

Conclusion

Morejon-Alonso, et al. demonstrated that the addition of tricalcium silicate to apatite cements might enhance the bioactivity and mechanical properties. Therefore, the fact that AHPB contains only 5-15 percent tricalcium silicate in comparison to conventional CS, which contains dicalcium silicate (7-15 percent) and tricalcium silicate (20-35 percent), may account for the decrease in AHPB's mechanical properties compared to WRST (both are CS sealers). Compression strength and chemical composition of calcium silicate materials may also be affected by pore morphology, sizes, porosity distribution, connectivity, and density percentages. The highest compression strength belonged to AHP; this is mostly due to the fact that the material contains epoxy resin, which affected its compression modulus. Small pores typically deformed laterally and then closed during the compression test.

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