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Bio-Ceramic Capping Materials' Effect on Vital Pulp Therapy Success

A. K. Sajdeya[1, 2], I. Abramovitz[2], A. Sharir[1, 2]

[1]1The Institute of Biomedical and Oral Research, Jerusalem, Israel, [2]Hebrew university, Jerusalem, Israel

Objectives Various materials are utilized to cap teeth and facilitate dentinal bridge formation, which effectively seals the pulp and mitigates further damage caused by deep caries or trauma. While studies have demonstrated that mineral trioxide aggregate (MTA) promotes dentinal bridge formation and maintains pulp vitality, there has been limited investigation into the in vitro and in vivo effectiveness of Biodentine. This study endeavors to conduct a controlled vital pulp therapy, specifically direct pulp capping on mouse molars, with the aim of comparing the dentinogenesis capabilities of MTA and Biodentine in mice

Methods A class I cavity was created on the first upper-right molar of mice under magnification. Pulp exposure was performed using K-File 10. The cavity was then capped using either MTA or Biodentine. To compare the healing process, mice were sacrificed at 3, 8, 14, 28, and 56 days after surgery. The healing process was evaluated using micro-computed tomography (µCT), histological staining, and sequential fluorochrome injections. Additionally, the proliferation of pulp cells was assessed using EdU labeling

Results µCT analysis, H&E, and Masson trichrome staining showed that Biodentine-treated mice had a more developed dentine bridge than MTA-treated mice after 28 and 56 days of recovery. Biodentine showed wider Calcein and Alizarine bands in the fluorochrome experiment than MTA, indicating that the dentine deposition rate was faster in the Biodentine group. The number of the early EdU labeled cells (label-retaining cells) was higher in Biodentine on day 3 after VPT, while The number of actively dividing cells was not different between the Biodentine and MTA groups on day 3 and 8

Conclusions Our findings imply that Biodentine promotes an earlier and more developed dentin bridge than of MTA -treated group after VPT