Healing Effects of a New Light-cured Resin-modified Pulp Capping Material Containing Calcium Silicate and Highly Hydrophilic Monomer as a Direct Pulp Capping Agent

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Abstract
Purpose: Accidentally exposed dental pulp has been conventionally treated by means of calcium hydroxide formulations. Recently, Mineral Trioxide Aggregate (MTA) has been widely used for direct pulp capping. Though MTA can adequately heal the wound-exposed pulp with good dentin-bridge formation, it has problems that need to be improved such as complicated clinical manipulation and long setting time. A new light-cured resin-modified pulp capping material containing calcium silicate and highly hydrophilic monomer has been developed. Therefore, this particular study was conducted to examine the healing ability of this newly developed pulp capping agent compared with that of MTA, by investigating histopathological changes of wound-exposed rat pulp.

Materials and Methods: Cavities with an exposed pulp area were prepared in the maxillary first molars of Wistar rats. After irrigation using alternating solutions of 10% sodium hypochlorite and 3% hydrogen peroxide, the pulps of the maxillary right first molars were capped with TheraCal LC (Bisco) and light-cured for 20 seconds (TCL group). In the same way, the maxillary left first molars were capped with ProRoot MTA (Dentsply-Sankin) and were left for 5 minutes (MTA group). After they were set, these cavities were sealed with Super Bond (Sun Medical), and the opposing mandibular teeth were extracted to avoid occlusion. After 7 or 14 days, the rats were sacrificed, and each tooth was fixed, decalcified, and prepared for paraffin-embedded sections. They were stained with hematoxylin-eosin (HE) for histological examination of pulpal changes.

Results: After 7 days, histopathological evaluation demonstrated slight chronic inflammatory cell infiltration, and complete or almost complete dentin-bridging in both TCL and MTA groups. After 14 days, the inflammatory response was reduced, and complete tubular dentin-bridges were observed underneath the exposed area in both groups.

Conclusion: This particular study revealed that the newly-developed and easy-to-use pulp capping material exhibited the excellent reparative healing ability of the exposed pulp, which was equivalent to MTA.

Key words: Calcium silicate, Highly hydrophilic monomer, MTA, Direct pulp capping effect