THE EFFECT OF DIFFERENT CURING TIME ON CYTOTOXICITY AND SOLUBILITY OF RESIN MODEFIED CALCIUM CONTAINING PULP CAPING MATERIAL

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By

Najah Abdalla Hammoda

B.D.S. Al-mergep University (2010)

Ain Shams University

(2019)

SUPERVISORS

Prof. Dr. Moktar Nagy Ibrahim

Prof. of Operative Dentistry

Faculty of Dentistry

Ain Shams University

Prof. Dr. Omaima Hassan Ahmed Ghallab

Prof. and Head of Operative Dentistry department

Faculty of Dentistry

Ain Shams University

Dr. Zainab Mohammed Diaa Eldin

Lecturer of Operative Dentistry

Faculty of Dentistry

Ain Shams University

DEDICATION

This thesis was dedicated to:

My husband, my parents, my brothers and my sisters for their endless love, help, support and encouragement.

My lovely sons

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INTRODUCTION

The main purpose of restorative dentistry is to restore and maintain tooth health, and preserve pulp vitality by adequate restorative treatment. Vital pulp tissue supports the long-term function of a tooth by contributing to the production of secondary dentin, peritubular dentin, and reparative dentin when biologic and pathologic stimuli are introduced[69]. Pulp capping involves the application of specific biomaterial between the pulp and restorative material in order to maintain pulp vitality, promote pulp healing and formation of reparative dentin [71].

Calcium silicate–based materials were introduced by Dr. Torabinejad in 1995 [41] as gray ProRoot MTA. They are hydrophilic materials which form calcium-silicate-hydrate gel and calcium hydroxide. These materials have high rate of ion release which depended on material hydration resulting apatite formation, and dentin bridge formation with lesser pulpal necrosis, and lesser inflammation. Due to these properties, the material was used as pulp capping material.

Unfortunately, the materials have a prolonged setting time [16]. And the solubility of these water-based materials depends on water-to-liquid ratio [41]. Soluble pulp capping material could leave a space, which will prevent the permanent seal leading to bacterial leakage and finally pulp death.

TheraCal (light cured resin modified calcium silicate) is MTA based that creates a new category of resin modified calcium silicates which

designed to release calcium ions to promote dentin bridge formation, with advantages of: good sealing, moisture tolerance so less solubility, controlled curing time, and easy application [43].

Water sorption of Theracal mainly depends on the monomer formulation, the hydrophilic monomers in TheraCal allows uptake of water, that involved for the hydration reaction of the calcium silicate in Theracal to form calcium hydroxide and calcium silicate hydrogel [50].

Resin based materials are characterized by a degree of cytotoxicity due to their resin content, the cytotoxic behavior is of prime importance because there materials are placed in direct contact with pulp cells [73]. The setting reaction of these resin materials depends on polymerization process, and the curing time will affect the polymerization reactions and the amount of residual monomer, which will affect the cytotoxic behavior and the solubility and water sorption of the material. So this study was aimed to evaluate the effect of different curing times on the solubility and cytotoxicity of resin based calcium containing material.