بســـم الله الرحمن الرحيـــم

(قالوا سبحانك لا علم لنا إلا ماعلمتنا إنك أنت العليم الحكيم)

صدق الله العظيم

سوره البقره آيه (٣٢)

Evaluation of the Sealing Ability of Mineral Trioxide Aggregate and Portland Cement as Furcation Perforation Repair Materials with and without the use of an Internal matrix

(An in-vitro study)

A thesis submitted to the Faculty of Oral and Dental Medicine, Cairo University, in partial fulfillment of the requirements of the Master Degree in Endodontics

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2010

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Acknowledgement

*First of all I thank **"ALLAH"**, who helped me and gave me patience to complete this work.*

*I would like to express my deep thanks and sincere gratitude to **Prof. Dr. Randa M. El Boghdadi**, Professor of Endodontics, Faculty of Oral and Dental Medicine, Cairo University, for her guidance, patience, encouragement and help throughout this work.*

*Deepest appreciation and thanks are dedicated to **Dr. Suzan Abdul Wanees Amin,** Lecturer of Endodontics, Faculty of Oral and Dental Medicine, Cairo University, for her valuable assistance and support during this study.*

*I wish to thank **Prof. Dr. Medhat Abd El-Rahman Kataia**, Professor and Chairman of the department of Endodontics, Faculty of Oral and Dental Medicine, Cairo University, for his kindness and support.*

Endless thanks are extended to all my professors, colleagues and staff members of the Department of Endodontics for their support and concern.

Dedication

To my supporting father and loving mother for their continuous help, love, support and for being there whenever I need them.

To my loving and supporting sisters, brothers and the new members of my family.

To my best friends Osama, Fares and all my friends for their love and support.

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Introduction

Introduction

Perforations are defined as mechanical or pathologic communications between the root canal system and the external tooth surface. The etiology of perforations could be caries, resorption, or iatrogenic factors. Regardless of the cause, a perforation allows bacterial invasion into the supporting structures that initially elicit inflammation and loss of attachment, which eventually may compromise the prognosis of the tooth. Perforation is a common cause of endodontic failure.

When left untreated, perforation of the pulpal floor of a multirooted tooth (furcation perforation) results in an inflammatory response in the supporting tissues, with epithelial proliferation and eventual periodontal pocket formation. Furcation perforations may be treated using either an internal (non-surgical) or external (surgical) approach. Factors that affect the prognosis after perforation include: the time perforation is open to contamination, the location, the perforation size, accessibility of the main canal, adequacy of seal, degree of contamination and the material used to seal the perforation.

Many materials have been advocated for repair furcation perforations, including zinc oxide-eugenol cements (e.g. IRM and Super-EBA), glass ionomer cement, composite resins, resin-glass ionomer hybrids, and mineral trioxide aggregate (MTA).

The original MTA was introduced to Endodontics in 1993 by Mahmoud Torabinejad as a gray ProRoot® MTA. In a way to overcome the color disadvantage of the original gray MTA, the manufacturer of the original brand substituted it by a new, tooth-colored patent, White (Tooth-colored) ProRoot® MTA in 2002.

Studies comparing MTA to Portland cement suggest that they are almost identical macroscopically and microscopically. According to information supplied in the Material Safety Data Sheet MTA consists of 75% Portland cement, 20% bismuth oxide and 5% calcium sulfate dehydrate.

Other studies found close similarity between MTA and Portland cement both chemically and biologically, suggesting the probability of using PC as a cheaper substitute to MTA. Several studies investigated the ability of MTA to seal furcation perforations; however, very few studies compared it to Portland cement with or without the use of an internal matrix which was the aim of the present study.

Review of Literature

Review of Literature

▪ Mineral trioxide aggregate and Portland cement:

Mineral trioxide aggregate is a material that has been developed in 1993 by Mahmoud Torabinejad in *Loma Linda University* and was introduced first as a lateral perforations repair material **(Lee et al. 1993)** and a root end filling material **(Torabinejad et al. 1993).**

Mineral trioxide aggregate is a derivative of Portland cement (PC) **(Abdullah et al. 2002).** It has been suggested as an available alternative material for various clinical applications such as pulp capping **(Pitt Ford et al. 1996),** periradicular tissue regeneration **(Torabinejad and Chivian 1999),** root-end closure **(Torabinejad et al. 1993, 1994),** and perforation repair in roots or furcations **(Soluti et al. 1993, Pitt Ford et al. 1995, Holland et al. 2001).**

Estrela et al. (2000) found that PC contained the same principal chemical elements as MTA, except for the radiopacifier bismuth oxide**. Ribeiro et al. (2006)** demonstrated that MTA and PC had no cytotoxic effects on Chinese hamster ovary cells and reported that these results might be an additional argument to support the use of PC in dental practice. Histological evaluation of pulpotomies in dogs using MTA and PC reported that both were effective as pulp protection materials **(Menezes et al. 2004). Conti et al. (2009)** used Portland cement as a medicament after pulpotomy of mandibular primary molars in children. Clinical and radiographic examinations showed that the treatments were successful in maintaining the teeth asymptomatic and preserving pulpal vitality.