بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

"Assessment of Efficacy of Photoactivated Disinfection versus Calcium Hydroxide Disinfection in Regeneration of Immature Infected Teeth"

(A comparative in vivo study)

Thesis

Submitted to the Faculty of Dentistry - Ain Shams University
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Dedication

I would like to dedicate this work to

my beloved family

who always believed in me. I would not have been where I am today without their continuous encouragement and love.

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my father, mother and my sisters

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LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Treatment of immature teeth with necrotic pulp is considered a challenge to a dentist. **First,** disinfection of these canals is very difficult since the use of aggressive instrumentation will lead to further weakening of the already thin root and will eventually lead to root fracture.

Second, obturating these canals is very difficult because the wide apex provides no apical stop for root filling material before invading the periodontal tissues.

Due to the previous challenges, historically apexification was introduced, its aim is the formation of a calcific barrier at the root terminus most often made of cementum like tissues, however due to the week root formed, several cases of fracture were reported after apexification.

MTA apexification was then introduced offering the option of a two-visit apexification procedure so that the fragile tooth can be restored immediately, however this treatment does not enhance the root length and thickness.

Recently, regenerative endodontics was suggested. Regeneration is a biologically based procedures designed to replace damaged structures such as dentin, root structure and cells of the pulp-dentine complex by using stem cells, scaffolds and growth factors.

Regenerative procedure depends mainly on disinfection rather than instrumentation. The most commonly used intra canal medicaments are calcium hydroxide and triple antibiotic paste that consist of metronidazole,

ciprofloxacin and minocycline). The minocycline was reported to make discoloration, so it was removed from the paste, and the paste was called double antibiotic paste.

Calcium hydroxide was considered a goal standard material for several decades due to its high alkalinity giving it excellent antibacterial properties also causing initial necrosis followed by repair and hard tissue formation.

Although intracanal medicaments have high antibacterial effect, it didn't provide the satisfactory disinfection. These materials depend on direct contact of the agent with the microbes so they cannot reach areas where bacteria are hidden, most of these materials lose their action after 24 hours and some of them cause toxicity.

Recently, new approaches are introduced for augmenting canal disinfection including photo activated disinfection. Many researches proved that laser was capable of not only smear layer removal and intra canal disinfection but also periapical disinfection.

REVIEW OF LITERATURE

Regeneration is a biologically based alternative approach that is used to treat immature teeth with necrotic pulp that allows continuation of root development, which leads to apical closure and strengthening of the root structure [(2)].

I. Regeneration as a treatment modality:

Regeneration is directly depending on the race between bacterial infection of the necrotic pulp and revascularization of the canal space by vital tissue using the ischemic pulp as a matrix.

In infected immature teeth, the potential for revascularization has been thought to be lost because mechanical instrumentation and irrigation with sodium hypochlorite has been proven to be ineffective in root canal disinfection[1]. However, Intracanal medicaments play an important role in eradication of bacteria.

Calcium hydroxide has been widely used in regenerative endodontics as it possesses many of the properties of an ideal root canal dressing, acting as a physical barrier, preventing root canal re-infection and interrupting the nutrient supply to the remaining bacteria. It also has ability to form hard-tissue barrier.

Calcium hydroxide effectiveness in disinfection is attributed to its ability to make the environment alkaline, which prevents bacterial multiplication.

$Ca(OH)_2$ has the advantage of being compatible with the survival of the stem cells of the apical papilla (SCAP), thus allowing their proliferation. A recent study showed that TAP, double antibiotic paste (DAP), and modified TAP in different concentrations reduced the survival of stem cells. On the other hand, $Ca(OH)_2$, even in high concentrations, maintained the viability of stem cells [(2)].

Cotti *et al.*, 2008[(3)] reported a case of a necrotic immature permanent central incisor using a regenerative approach. The root canal was gently debrided of necrotic tissue with a sharp spoon excavator and irrigated for only one third of its length with NaOCl and then medicated with calcium hydroxide. After 15 days the tooth was asymptomatic, calcium hydroxide was removed, bleeding was stimulated to form an intracanal blood clot, and mineral trioxide aggregate was placed coronally to the blood clot. After 8 months, a coronal calcified barrier was radiographically evident and accompanied with progressive thickening of the root wall and apical closure. Two and a half years after treatment was initiated, the tooth remained asymptomatic. The progressive increase in the thickness of the dentinal walls and subsequent apical development suggest that appropriate biologic responses can occur with this type of treatment.

Bose *et al.*, 2009[(4)] performed a retrospective study by collecting radiographs from 54 published and unpublished endodontic regenerative cases and 40 control cases (20 apexification and 20 nonsurgical root canal treatments) and used a geometrical imaging program, NIH ImageJ with TurboReg plug-in, to minimize potential differences in angulations between the preoperative and recall images and to calculate continued development of root length and dentin wall thickness. Results showed