The Effect of Different Irrigating Solutions on the Mineral Content and Cleanliness of Root Canal Dentin

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DEDICATION

To

My Dear Parents whom I owe everything I ever did and will achieve.

They gave me support whenever I needed and encouraged me all the way with my practice.

I wish them the best of all .

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بسم الله الرحمن الرحيم

" قَالُوْا سُبْحَانَكَ لا عِلْمَ لَنَا إِلا مَا عَلَّمْتَنَا
إِنَّكَ أَنْتَ العَلِيمُ الحَكِيمُ "

صدق الله العظيم

(البقرة – الآية ٣٢)

INTRODUCTION

Efficient cleaning of the root canal system is a major prerequisite for successful treatment outcomes . It entails removal of all contents of the root canal system before and during shaping through the use of instruments which physically remove substances . Irrigating solutions flushed loosened material away and dissolved contents from inaccessible regions.

Some endodontic irrigants are capable of altering the chemical composition of dentin by removal of major inorganic elements such as calcium ions present in the hydroxyapatite crystals. Changes in the Calcium ratio might change the microhardness, permeability, and solubility characteristics of dentin, owing to the alteration of the original proportion of organic and inorganic components.

It has been shown that an amorphous smear layer composed of inorganic and organic material is produced on root canal walls after instrumentation. Removal of this layer prior to root canal obturation is controversial. It has been suggested that the smear layer may decrease dentin permeability and prevent bacterial penetration into the underlying dentinal tubules .Others believe that the smear layer may contain bacteria and might prevent

antimicrobial agents from gaining access to underlying contaminated dentinal tubules. Removal of smear layer may enhance the seal achieved during root canal obturation.

Nevertheless, the chemical agents used for the removal of smear layer had a remarkable effect on both the organic and inorganic components of root canal dentin, with consequent changes in its chemical, mechanical and physical properties. Therefore conducting a study to assess the effect of commonly used endodontic irrigating solutions on some chemical and physical properties of root canal dentin was thought to be of value.

REVIEW OF LITERATURE

The effect of irrigating solutions on the mineral content of root canal dentin:

Hennequin et al [1] determined the calcium and phosphorus contents of the cervical, middle and apical radicular thirds before and after treatment with different pH values of citric acid solutions in eighteen mandibular incisors roots using an electron microprobe analyzer. The teeth were divided into six groups . The first group was treated with water (control) while groups two to six were treated with citric acid solutions with pH values 0.8, 1.1, 1.3, 1.5 and 1.7. The relative calcium and phosphorus loss values obtained from the samples were significantly different from those obtained in the control group. The demineralizing effect of the pH 0.8 and pH 1.3 solutions was the same and both being less effective than that of pH 1.1 solution.

Dogan and Calt [2] studied the effect of combined and single use of EDTA ,RC-Prep and NaOCl on mineral content of root dentin in vitro using energy dispersion spectrometric analysis. Thirty six standardized midroot dentin specimens were obtained from human anterior teeth .Specimens were polished and divided into 6 groups .The first two groups were treated with EDTA or RC-Prep followed by NaOCl irrigation. Groups 3 to 5 were

treated with EDTA,RC-prep and NaOCl respectively,the last group was irrigated with saline as a control.The results showed that EDTA followed by NaOCl irrigation as final flush and NaOCl alone significantly increased the Ca/P ratio of root dentin . Also there was a significant increase in the magnesium level after the use of chelating agent combined with NaOCl when compared with use of chelating agents alone and with control group.

Serper and Calt [3] compared the effect of different concentrations and pH values of EDTA on dentin demineralization. The amount of liberated phosphorus concentrations from twenty single human root canals was measured at 10 %,17 % concentration at pH 7.5 and 9.0 by 747 automatic analyzer after 1,3,5,10 and 15 minutes of exposure. The results showed that amount of phosphorus liberated from dentin was greater with increased EDTA concentration and increased time of exposure, and it was more effective at neutral pH than pH9.

Silveiro et al [4] measured the demineralization capability of 1% and 10 % citric acid,10% sodium citrate and 17 %EDTA during immersion times of 5,10 and 15 minutes on dentin slices.Each slice was sectioned into 4 equal parts. Each specimen underwent 3 successive 5 min immersions in each solution which were not renewed between immersions then spectrophotometry