



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

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By

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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 .

LIST OF CONTENTS

Title	Page No.
INTRODUCTION	1
REVIEW OF LITERATURE	3
The effect of irrigating solutions on the mineral content of root canal dentin	3
The cleanliness of root canal dentin	12
AIM OF THE STUDY	34
MATERIALS AND METHODS	35
RESULT	47
DISCUSSION	74
SUMMARY AND CONCLUSION	83
REFERENCES	87
APPENDIX	99
ARABIC SUMMARY	-

LIST OF FIGURES

Fig. No.	Title	Page No.
1	The two indentations made in root canal specimen	40
2	The beaker with wax in its base and specimen embedded in it	40
3	Scanning electron microscope/energy dispersive X ray (SEM/EDX) System	41
4	Energy dispersive x-ray analysis unit(EDX unit)	41
5	The mean percentage change in calcium level in all tested subgroups.	53
6	The mean of percentage change in phosphorus level in all tested subgroups.	53
7	Mean percentage values of debris in subgroup II a (NaOCl + MTAD)	64
8	Mean percentage values of debris in subgroup II b (CHX + MTAD)	64
9	Mean percentage values of debris in subgroup II c (NaOCl + EDTA)	65
10	Mean percentage values of debris in coronal third of all subgroups	65
11	Mean percentage values of debris in middle third of all subgroups	66
12	Mean percentage values of debris in apical third of all subgroups	66
13	Stereo micrograph showing the coronal third of subgroup IIa :NaOCl + MTAD	68
14	Stereomicrograph showing the middle third of subgroup II a: NaOCl+ MTAD	68
15	Stereomicrograph showing the apical third of subgroup II a: NaOCl+ MTAD	68
16	Stereo micrograph showing the coronal third of subgroup II b : CHX + MTAD	69
17	Stereomicrograph showing middle third of subgroup II b : CHX + MTAD	69

Fig. No.	Title	Page No.
18	Stereomicrograph showing apical third of subgroup II b: CHX + MTAD	69
19	Stereomicrograph showing coronal third of subgroup II c : NaOCl +EDTA	70
20	Stereomicrograph showing middle third of subgroup II c : NaOCl+EDTA	70
21	Stereomicrograph showing apical third of subgroup II c: NaOCl+EDTA	70
22	SEM photomicrograph of subgroup II a (NaOCl + MTAD) coronal third	71
23	SEM photomicrograph of subgroup II a (NaOCl+ MTAD) middle third	71
24	SEM photomicrograph of subgroup II a (NaOCl +MTAD) apical third	71
25	SEM photomicrograph of subgroup II b (CHX + MTAD) coronal third	72
26	SEM photomicrograph of subgroup II b (CHX + MTAD) middle third	72
27	SEM photomicrograph of subgroup II b (CHX + MTAD) apical third	72
28	SEM photomicrograph of subgroup II c (NaOCl +EDTA) coronal third	73
29	SEM photomicrograph of subgroup II c (NaOCl+EDTA) middle third	73
30	SEM photomicrograph of subgroup II c (NaOCl +EDTA) apical third	73

LIST OF GRAPHS

Graph No.	Title	Page No.
1	EDX analysis for calcium and phosphorus contents before treatment with NaOCl +MTAD (subgroup I a).	54
2	EDX analysis Calcium & phosphorus contents after treatment with NaOCl +MTAD (subgroup I a) of the same sample.	54
3	EDX analysis for calcium and phosphorus contents before treatment with chlorohexidine +MTAD (subgroup I b).	55
4	EDX analysis for calcium and phosphorus contents after treatment with chlorohexidine +MTAD (subgroup I b) of the same sample.	55
5	EDX analysis for Calcium and phosphorus contents before treatment with NaOCl +EDTA (subgroup Ic).	56
6	EDX analysis for calcium and phosphorus contents after treatment with NaOCl +EDTA (subgroup Ic) of the same sample	56

LIST OF TABLES

Table No.	Title	Page No.
1	The Mean pre irrigation, post irrigation and percentage change, maximum and minimum values for calcium level for all tested subgroups.	50
2	The Mean pre irrigation, post irrigation , percentage change means , maximum and minimum values for phosphorus level for all tested subgroups\	51
3	Statistical analysis of percentage change in calcium level for all subgroups.	52
4	Statistical analysis of percentage change in phosphorus level for all subgroups.	52
5	The mean percentage values and standard deviations of debris for all subgroups .	60
6	Statistical analysis of subgroup II a (NaOCl +MTAD)	60
7	Statistical analysis of subgroup II b (CHX +MTAD)	61
8	Statistical analysis of subgroup II C (NaOCl+EDTA)	61
9	Statistical analysis of the coronal third of all subgroups	62
10	Statistical analysis of the middle third of all subgroups	62
11	Statistical analysis of the apical third of all subgroups	63
12	Percent change in Calcium level after irrigation with NaOCl + MTAD (subgroup I a)	99
13	Percent change in Calcium level after irrigation with CHX +MTAD (subgroup I b)	100
14	Percent change in Calcium level after irrigation with NaOCl + EDTA (subgroup I c)	101
15	Percent change in phosphorus level after irrigation with NaOCl +MTAD (subgroup Ia)	102
16	Percent change in phosphorus level after irrigation with CHX + MTAD (sugroup I b)	103

Table No.	Title	Page No.
17	Percent change in phosphorus level after irrigation with NaOCl+EDTA (subgroup I c)	104
18	showing percentage of debris for subgroup II a (NaOCl+ MTAD)	105
19	showing percentage of debris for subgroup II b (CHX+MTAD)	106
20	showing percentage of debris for subgroup II C (NaOCl + EDTA)	107

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

" قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ "

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