

A Sem Comparative Study Of Effects Of 2 Commercial Types Of Edta + Naocl For Smear Layer Removal

Abstract

Objectives : The aim of this study was to compare the effects of Ethylen diamine tetraacetic Acid (Ariadent - Iran) with Ethylenediamine tetraacetic acid (Merck - Germany) accompanied with Naocl for their smear layer removal capacity using scanning electron microscopy technique.

Materials & Methods : This study was performed on a total of 28 straight single root teeth. 4 teeth were assigned as a control group and the other 24 teeth were divided into two experimental groups (group A and group B), each group consisting of 12 teeth. Access cavities were made by diamond burs on all samples and all roots were prepared up to # 60 instrument using step back technique. The roots of the group A were irrigated with 10 mls of 17% EDTA (Ariadent Iran) and the roots of the group B were irrigated with 10 mls of 17% EDTA (Merck - Germany) for 1 minute respectively. After application of the EDTA, the roots of both groups were irrigated with 10 mls of 5.25% Naocl solution. The roots of the control group were just irrigated with 10 mls of 5.25% Naocl solution. All samples were sectioned longitudinally by diamond discs and were observed by 2 blinded observers via scanning electron microscopy.

Results : SEM analysis of the longitudinally sectioned roots of both experimental groups showed that both Iranian and foreign 17% EDTA solution + 5.25% Naocl could remove the smear layer from coronal, middle and apical thirds of the root canal walls completely. The Kruskal-Wallis test revealed a significant statistical difference ($P < 0.05$) between both group A and B with the control group. No significant statistical difference was observed between group A and the group B ($P > 0.05$).

Conclusion : 17% EDTA solution (Ariadent - Iran) Could be used instead of foreign solution of EDTA with similar capacities and less price.

Key Words

Smear layer, Removal, EDTA

¹ Maryam kuzekanani

¹ Associate Professor
Department of Endodontics
Kerman Dental School, Iran

Address For Correspondence:

Maryam kuzekanani
Associate Professor
Department of Endodontics
Kerman Dental School, Iran
Email ID : maryamk6717@gmail.com
maryam_30002001@yahoo.com
Mobile : 00989131416717

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Introduction

The smear layer originated from endodontic instrumentation is a thin layer with average thickness of 1 micrometer which occludes the dentinal tubules of the prepared root canal walls.^(1,2) Some investigators believe that it is beneficial to remove the smear layer for eliminating the microorganisms inside the root canal system and to improve the obturation seal while others believe preserving that occludes the orifices of dentinal tubuli and prevents the penetration of irrigants, medications and filling materials into the dentinal tubules so it is still controversial whether to remove or to remain this layer. The irrigation of root canal system with 10 mls of 17% Ethylene Diamine Tetraacetic Acid (EDTA) followed by 10 mls of 5.25% Naocl is the most effective method for smear layer removal since EDTA removes the inorganic portions of the smear layer while Naocl solution dissolves and bubbles out the organic compartments of this layer.^(3,4,5) The

purpose of this research was to compare the effects of 2 commercial types of EDTA with final irrigation of the root canals with 5.25% Naocl for removing the smear layer.

Materials And Methods

28 straight single root teeth with mature apices were collected from dental clinics. These teeth were extracted for full denture purposes. The teeth were immersed within 10% formalin solution (Merck - Germany) first and were kept in Normal saline (Samen - Mashad) through performing the research. Access cavities were made by diamond bur (Diatech - Germany) on the teeth and all samples were instrumented up to the # 60 by K files (mailferr Swiss). The samples were irrigated with 5.25% Naocl solution (Shimin - Iran) during the cleaning and shaping procedure. These teeth were divided into 2 experimental groups (Group A and GroupB) each group consisting of 12 teeth. The remaining

four teeth were assigned as a control group. After instrumentation, the root canal systems of the group A samples were irrigated with 10 mls of 17% EDTA (Ariadent_Iran) followed by 10 mls of 5.25%Naocl and the group B were irrigated with 10 mls of 17% EDTA (Merck - Germany) followed by 10 mls of 5.25% Naocl respectively. The time of application of the EDTA was 1 minute in both groups.

The control group were just irrigated with 10 mls of 5.25% Naocl. The crowns of the teeth were removed by a diamond Disc # 4 (Diatech - Germany) at the cemento enamel junction. Finally the roots of all experimental groups were sectioned longitudinally and were processed for SEM (Oxford England) observation at 2000 X magnification. The smear layer removed in each experimental group was scored in a blind manner according to Schafer,s grading criteria. (6,7,8,9,10,11)

Results

Both Iranian and foreign 17% EDTA + 5.25% NAOCL solution had successfully removed smear layer from all parts of the sectioned root

Canals. (Score 1). So there was significant statistical difference between both Group A and Group B samples with the control group in which the smear layer had completely covered all parts of the roots. (Score 5) ($p < 0.05$). There was not significant statistical difference between group A and group B. ($P > 0.05$).

Discussion

In this study the smear layer removing efficacy of 2 different commercial types of Ethylene diamine tetraacetic acid solutions with similar concentrations (17%) was compared and evaluated. All extracted teeth had straight root canals and the amount of preparation was the same in all groups. The time of application of the EDTA and also the time of final irrigation the root canals with 5.25% NAOCL solution was the same in all experimental groups. So just the capacity of these 2 commercial trends of this chemical composition (EDTA) was compared for the purpose of the smear layer removal.

In the past, several different studies have confirmed the smear layer removing efficacy of the chelating agent Ethylene Diamine Tetraacetic acid.⁽¹²⁾ Results of the current investigation corroborate with the findings of Crumpton et al who reported complete removal of smear layer and lower erosiveness of this irrigation regimen in 2005.⁽¹³⁾ On the other hand Calt & Serper, Niu & Yoshioka and Gande & Plotino have reported that the application of 17% EDTA longer than 1 minute can cause adverse erosion of the root canal surfaces.^(9,14,15) The PH of the EDTA is another important factor which affects the debris and smear layer removing capacity of this solution. In this study The PH of applied EDTA in both group A and group B was between 6 and 10 which is a neutral PH that has previously been shown to be more effective than acidic and alkaline PH for removing the smear layer.⁽¹⁶⁾

Conclusion

Based on the results of this investigation it seems that the Iranian product of EDTA made by Ariadent company has similar

capacity of removing the smear layer with the international type made by Merck company in Germany with less price.

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