Effectiveness of Smear Layer Removal by different EDTA Formulations Prepared the Faculty of Dentistry, CMU

Abstract

The purpose of this study was to evaluate the effect of different irrigating solutions on smear layer removal on root canal surfaces. The irrigating solutions were 17% disodium EDTA, 17% tetrasodium EDTA and Ultradent®. The first two formulations were produced in the Faculty of Dentistry, Chiang Mai University. Ultradent® was imported from the USA. The crowns of 16 permanent premolar teeth with single roots were cut off. The root canals were then enlarged with a standardized technique until K-file No.50 could reach the working length, and irrigated with 5.25% NaOCl during cleaning and shaping. The

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teeth were divided into three experimental groups (n=5) and one positive control (n=1). The teeth in the experimental groups received a rinse of each EDTA formulation for one minute and a final rinse of 5.25% NaOCl. The positive control was not rinsed with EDTA, but it did receive a final rinse of 5.25% NaOCl. All of the teeth were then split longitudinally and prepared for scanning electron microscopy imaging. Digital images (2000x) of the coronal, middle and apical sections were graded for the presence of smear layer. The data were statistically analyzed using the Kruskal-Wallis test and the Mann-Whitney U test. The root canal surfaces of the control were completely covered with smear layers. The presence of smear layers, on the surfaces rinsed by 17% disodium EDTA and 17% tetrasodium EDTA were significantly less than on those rinsed by Ultradent® (p<0.05), but there was no significant difference between the first two formulations (p>0.05).

Keywords: disodium EDTA, tetrasodium EDTA, Ultradent®, smear layer
ガラスフライ[8-9] がガラスフライメローグラフに使われる。材料を
ガラスフライ（citric acid）ガラスフライ
（lactic acid）ガラスフライ（phosphoric acid）と
ナリフライ（EDTA）を含むガラスフライメローグラフ（ultrasonic）
材を後処理したガラスフライと、マッハ力学的に大きな

**ワジュールファームとビオグラフィ**

1. **ガラスフライメローグラフの**

ガラスフライメローグラフの材料は、主にガラスフライメローグラフ
ガラスフライメローグラフ（Scanning Electron Microscope, SEM）
を使い、目的、ガラスフライメローグラフは、ガラスフライメローグラフ
にガラスフライメローグラフ、ガラスフライメローグラフ
ガラスフライメローグラフ、ガラスフライメローグラフ
ガラスフライメローグラフ、ガラスフライメローグラフ

Figure 1  デラクトファームの高密度ガラスフェースホーローを

**図 1**  代表的なガラスフライメローグラフの長さを示す

**footnote**

[8-9] ガラスフライメローグラフがガラスフライメローグラフに使われる。
ผลการศึกษา

กลุ่มควบคุมมีผลมากที่สุด ไม่ได้ใช้น้ำยาซีดีที่ละลาย พบว่ารูสมีน้ำยาซุปกรณ์ที่มีในการเสมือนที่ในผลการศึกษา

ผลการศึกษา

กลุ่มน้ำยาซีดีที่ละลาย พบว่ารูสมีน้ำยาซุปกรณ์ที่มีในการเสมือนที่ในผลการศึกษา

Figure 2 The positions for SEM imaging on root canal surface.
Figure 3 Representative SEM photomicrographs of the smear layers on root canal wall: grade 1-4.

Grade 1: 0%-25% of dentinal tubules covered with smear layers
Grade 2: 25%-50% of dentinal tubules covered with smear layers
Grade 3: 50%-75% of dentinal tubules covered with smear layers
Grade 4: 75% -100% of dentinal tubules covered with smear layers

Figure 4 Average quantity of the smear layers left after irrigation with each EDTA formulation.

Groups identified with different letters are statistically different (P<0.05).

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Table 1 Mean smear scores of the remaining smear layer among the coronal, middle, and apical thirds of the canals in each group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Coronal 1/3 score Mean</th>
<th>Middle 1/3 score Mean</th>
<th>Apical 1/3 score Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Control (n=3)</td>
<td>0 0 0 3</td>
<td>4.00</td>
<td>0 0 0 3</td>
</tr>
<tr>
<td>Disodium EDTA (n=15)</td>
<td>6 7 2 0</td>
<td>1.73a</td>
<td>5 6 4 0</td>
</tr>
<tr>
<td>Tetrasodium EDTA (n=15)</td>
<td>2 8 3 2</td>
<td>2.33a,b</td>
<td>4 7 2 2</td>
</tr>
<tr>
<td>Ultradent (n=15)</td>
<td>2 5 5 3</td>
<td>2.60b</td>
<td>0 4 9 2</td>
</tr>
</tbody>
</table>

Groups identified with different letters are statistically different (P<0.05).


33. Huang TY, Gulabivala K, Ng YL. A biomolecular film ex-vivo model to evaluate the influence of canal dimensions and irrigation variables on the efficacy of irrigation. *Int Endod J* 2008; 41: 60-71.

