A comparative study of the sealing ability of two different obturation techniques with and without the use of sealers.

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ABSTRACT
Background: The final stage of endodontic therapy is complete obturation of the root canal system to provide as perfect as possible at the cemento-dentinal junction of the apical foramen. The purpose of this in vitro study was to evaluate the sealing ability of injection molded thermoplasticized gutta percha and lateral condensation techniques with and without the use of sealers.

Materials and Methods: Forty freshly extracted adult human maxillary central incisors with complete formed apices were utilized in this study. The teeth were randomly divided into four groups for evaluation of the apical seal. Group (1) lateral condensation gutta percha technique without sealer, (2) lateral condensation gutta percha technique with sealer, (3) Injection molded thermoplasticized gutta percha without sealer, (4) injection molded thermoplasticized gutta percha with sealer. Groups 1 through 4 were obturated as specified. All of the teeth were immersed in fluorescein dye for 48 hours, then they were removed from the dye for microleakage measurement.

Results: The results showed no significant differences between groups 1 and 3 and between groups 2 and 3 (p>0.05), but there were highly significant differences between groups 1 and 3 (p<0.01).

Conclusion: Sealer was found to be an essential part of the thermo plasticized gutta percha and lateral condensation techniques. Thermoplasticized system with sealer had significantly less apical leakage than others. The highest amount of leakage was significantly seen with lateral condensation without sealer.

Key words: Obturation techniques, sealer, microleakage.

INTRODUCTION
The primary goal of successful endodontic therapy is complete obturation of the root canal space, after it has been adequately prepared and sterilized to prevent any pathosis of endodontic origin. Solid core filling material such as gutta percha had been used to obturate the root canals in conjunction with a sealer to provide a hermetic seal and prevent apical leakage. It has been shown that the thoroughness with which the root canal system is sealed is a major determinant in endodontic success. Many materials have been used as root canal fillings over the years, but a material in paste form in conjunction with gutta percha seems to be the most widely accepted combination of materials in use. Different techniques and approaches are available that depend on the size of the prepared canal, the final shape of the preparation and irregularities within the canal, but the overriding factor is operator preference.

The lateral condensation technique is relatively uncomplicated which requires a single armamentarium, and the philosophy of the lateral compact technique depends upon the fitness of perfect filling of the core in the apical third of the root canal.
working length was established 1mm short of the apical foramen after a no. 15 file was visualized beyond the foramen. Hand files (Stainless, Kerr Corp., Italy) were used in progressive sizes until the apical preparation was instrumented to a no. 45 file. All instruments were accompanied by 5.25% NaOCl as an irrigant solution. A step back procedure was then accomplished with files and gates Glidden drill (Union Broach Co. Germany), so that a 23 gauge needle of the obtura syringe would fit within 6 mm of the apex. A no. 20 file was passed through the foramen until visualized, the file was removed and the irrigant was forced through the apical opening. After drying, three coats of nail polish were applied to the roots but not covering the apical foramen, then the irrigant was again forced through the apical constriction to ensure patency. Groups 1 through 4 were obturated as specified; the access openings were closed with amalgam (Degussa, Germany) and the sealer was allowed to set for 48 hours.

All the obturated teeth were then radiographed mesiodistally and buccolingually to determine if they were properly condensed. All the roots were then immersed in fluorescence dye (Baket Bot Corp. England) for 48 hours, and then the teeth were removed from the dye and washed. Cross sections were made using a diamond disc at 1, 3, 5 and 7 mm from the apex and were evaluated under a dissecting microscope supplied with a micrometer gauge (Wild, Heerbrugg, Switzerland). The presence or absence of dye penetration between the gutta perga and dentin and any fractures present were recorded for each section. The groups were compared by using a one way analysis of variance test (9).

RESULTS

The data of this in vitro study are displayed in Table 1 and Figure 1

Table 1: Statistical analysis of the mean leakage in (mms) for the experimental groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of technique</th>
<th>No. of teeth</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lateral cond. without sealer</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td>2</td>
<td>Lateral cond. with sealer</td>
<td>10</td>
<td>2.2</td>
</tr>
<tr>
<td>3</td>
<td>Obtura without sealer</td>
<td>10</td>
<td>4.1</td>
</tr>
<tr>
<td>4</td>
<td>Obtura with sealer</td>
<td>10</td>
<td>1.8</td>
</tr>
</tbody>
</table>

One way analysis of variance test was performed to test the differences between the means of leakage among the experimental groups. Group 1 and group 3 showed no significant difference in leakage (p>0.05), also there was no significant difference between groups 2 and 4. On the other hand, there was a highly significant difference between groups 1 and 3 as compared with groups 2 and 4 (p<0.01).

DISCUSSION

The search for the ideal root canal filling material as determined by Grossman's criteria is a continuous one (10). It is well established that the sealer cement is an extremely important component of the root canal filling in order to achieve a three dimensional obturation of the root canal space (11). Group 4 (thermo plasticized gutta percha with sealer) demonstrated the least amount of leakage, which agrees with the study's conclusions that when used in conjunction with a sealer, thermo plasticized gutta percha provides an adequate seal (12). The obturation groups without sealer revealed the highest amount of leakage, this result is also in agreement with a study done by Michanowicz.&Czonstkowsky. (13) These positive results are probably due to the sealer's ability to fill voids missed by gutta percha and to it's lubricant action. Skinner and Himel (9) showed that whether or not vertical compaction was used...
in conjunction with the obtura system did not make a significant difference in leakage when used in large straight canals. There was no significant difference between groups 2 and 4 probably due to the presence of sealers.

REFERENCES