Assessment of effectiveness of two Different Rotary Retreatment Systems in Removing Gutta-Percha from Root Canals- An In Vitro study

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ABSTRACT

Background: The present study was undertaken for assessing the effectiveness of two Different Rotary Retreatment Systems in Removing Gutta-Percha from Root Canals.

Materials & methods: 30 single rooted freshly extracted mandibular premolars were selected. Preparation of the access cavities was done. Size 10 K file was inserted into the pulp canal for visualization of the apex. Assessment of the working length was done. This was followed by canal preparation and subsequently obturation. After a time period of three weeks, all the specimens were randomly divided into three study groups with 10 specimens in each group as follows: Group A: In which retreatment was done with Hedstrom Files, Group B: In which retreatment was done with R-Endo Retreatment Files, & Group C: In which retreatment was done with Neoendo retreatment files. Time taken for retreatment was recorded for each tooth using a stopwatch. The sample were sectioned longitudinally and observed under a stereomicroscope. The data was statistically analysed using kruskal wallis and post hoc Mann-Whitney test.

Results: Neoendo group showed significantly lower amount of residual material when compare to R-Endo. Significant results were obtained while comparing the mean Gutta Percha retreatment (P= 0.00).The maximum residual material was observed in H file group. The time taken for gutta percha removal was least for Neoendo group.

Conclusion: None of the instruments were able to remove the filling material completely. Gutta percha removal using Neoendo retreatment files were faster and more efficient compared to R-Endo and H files.

Key words: Rotary Retreatment, Neoendo, R-Endo, H files.

INTRODUCTION

According to the Glossary of Endodontics, retreatment is a procedure to remove root canal filling material from the tooth, followed by cleaning, shaping, and obturation of the canals. After the root canal procedure, a tooth may require retreatment because of persistent infection or reinfection of the root canal. In addition, teeth with inadequate obturation, unfilled or untreated root canals, or under extended root fillings may require retreatment before coronal restoration as failure may occur in future.¹-³

The main goal of nonsurgical root canal retreatment is to re-establish healthy periapical tissues. Only if the filling can be removed completely and the canal negotiated to the apical foramen, can the prerequisites for successful retreatment be fulfilled? The success rates of orthograde retreatment are reported to range from approximately 65% to more than 80%. Many materials are being used for the
filling of root canals, of which Gutta-percha (GP) with a variety of sealers is the most common. Many techniques have been advocated for the removal of GP in root canal-treated teeth.\textsuperscript{4-6} Neoendo retreatment files (Orikam) consist of three instruments: N1, N2 and N3 which are 16, 18 and 25 mm in length respectively. N1 (size 30, 0.09 taper) is used at the coronal third. N2 (size 25, 0.08 taper) is used at middle third. N3 (size 20, 0.07 taper) is used till apical third.

R-Endo instruments (Micro-Mega, Basancon, France) consist of Rm, Re, R1, R2 and R3 are used in a gentle in and out motion. Rm (size 25, 12% taper) removes the initial 2 to 3 mm of obturation material, R1 (size 25, 0.08 taper) and R2 (size 25, 0.06 taper) are used at the coronal and middle third. R3 is used till the apical third.\textsuperscript{7} Hence; the present study was undertaken for assessing the effectiveness of two different Rotary Retreatment Systems in Removing Gutta-Percha from Root Canals.

**MATERIALS & METHODS**

The present study was undertaken for assessing the effectiveness of two different Rotary Retreatment Systems in Removing Gutta-Percha from Root Canals. 30 single rooted freshly extracted mandibular premolars were selected. Preparation of the access cavities was done. Size 10 K file was inserted into the pulp canal for visualization of the apex. Assessment of the working length was done. This was followed by canal preparation and subsequently obturation. Final coronal flaring was done with Glades Glidden drills. Continuous irrigation of the root canal space was done during the instrumentation procedure. The root canals were dried with paper points and obturated with gutta percha and AH Plus sealer. Sealing of the access cavities were done temporarily with Cavit. After a time period of three weeks, all the specimens were randomly divided into three study groups with 10 specimens in each group as follows:

- **Group A:** In which retreatment was done with Hedstrom Files
- **Group B:** In which retreatment was done with R-Endo Retreatment Files, &
- **Group C:** In which retreatment was done with Neoendo retreatment files

Residual Gutta Percha in the roots was grooved longitudinally and was split into two halves by a diamond disc. The specimens were observed under a stereomicroscope at 12.5X magnification and images were captured and analysed using digital image analysing software. The retreatment time was measured for each tooth and the percentage of residual filling material in the root canal walls was calculated. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

**STATISTICAL ANALYSIS**

Kruskal Wallis test was done to check the statistical difference of mean percentage of total gutta-percha remnant. Post hoc Man-Whitney test was used for pair wise group comparison.

**RESULTS**

Mean Gutta Percha remnants remaining among specimens of Group A, Group B and group C was 35.8, 28.4 and 13.6 respectively. Significant results were obtained while comparing the mean Gutta Percha Remnants remaining. Mean Gutta Percha retreatment time among specimens of Group A, Group B and group C was 418.2, 268.3 and 141.5 respectively. Significant results were obtained while comparing the mean Gutta Percha retreatment time.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Gutta Percha Remnants remaining</th>
<th>SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>35.8</td>
<td>0.85</td>
<td>0.00 (Significant)</td>
</tr>
<tr>
<td>Group B</td>
<td>28.4</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Group C</td>
<td>13.6</td>
<td>0.42</td>
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</table>
Table 1: Comparison of groups for Gutta Percha retreatment time

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Gutta Percha retreatment time</th>
<th>SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>418.2</td>
<td>22.5</td>
<td>0.00 (Significant)</td>
</tr>
<tr>
<td>Group B</td>
<td>268.3</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Group C</td>
<td>141.5</td>
<td>8.4</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

A growing interest in endodontic retreatment has been seen recently, caused by an increasing demand to preserve teeth, including those cases where endodontic therapy had failed. Endodontic failure may occur in cases where there are persistent bacteria present due to insufficient cleaning or inadequate obturation. In retreatment cases, the first primary purpose of endodontic therapy is the complete removal of GP from the root canal system. This is a very tedious and time consuming job. Endodontists recommend retreatment for establishing the healthy periapical tissue with the purpose of removing the infection due to leakage (coronal or apical). This is done by creating access to the pulp canal system by removing the obturating material from the root canal, followed by further cleaning and finally reobturating. For the complete removal of GP fillings, various instruments and instrumentation motions are available. Ideally all the filling materials should be removed from the canal to gain access to microorganisms and remnant tissues. The commonly encountered root-canal filling material requiring removal is gutta-percha. Gutta-percha is usually removed with Hedstrom files alone or in combination with Gates Glidden drills (GG drills) with or without solvents. Other techniques proposed include heated instruments, rotary files, ultrasonic instruments, and lasers.\(^6\)\(^-\)\(^11\)

Mean Gutta Percha remnants remaining among specimens of Group A, Group B and group C was 35.8, 28.4 and 13.6 respectively. Significant results were obtained while comparing the mean Gutta Percha Remnants remaining. Our results were in concordance with the results obtained by Muraleedhar AV et al who also reported similar findings. In their study, authors compared the efficacy of three different rotary systems compared with manual instrumentation for gutta percha removal during retreatment. Forty-eight single rooted premolars were prepared and obturated using gutta percha and AH Plus sealer using lateral compaction technique. Samples were randomly divided into four groups of 12 specimens each. Group 1 was retreated with Hedstrom Files (H-Files), group 2 was retreated with pro taper universal retreatment files (PTUR), group 3 with R-Endo retreatment files and group 4 with Neoendo retreatment files. The Neoendo group showed significantly lower amount of residual material compared to PTUR, R-Endo and the H-Files (\(P = 0.00\)). The maximum residual material was observed in the H file group. The time taken for gutta percha removal was least for the Neoendo group followed by PTUR, R-Endo and H-Files. None of the instruments were able to remove the filling material completely.\(^12\)

In the present study, Mean Gutta Percha retreatment time among specimens of Group A, Group B and group C was 418.2, 268.3 and 141.5 respectively. Significant results were obtained while comparing the mean Gutta Percha retreatment time. In another study conducted by Patil et al, authors assessed the efficacy of D-RaCe files, ProTaper retreatment files, Mtwo retreatment files, and manual Hedstrom files (H-files) in removing filling materials from the root canals of the endodontically treated teeth. Least quantity of filling material was left by ProTaper retreatment files. When put together in decreasing order, the efficacy of different study groups, in terms of mean time taken for retreatment, was found to be as follows: D-RaCe > ProTaper Retreatment > Mtwo Retreatment > H-file. No single technique can completely remove obturating fillings from the root canals of endodontically treated teeth. Efficacy of Rotary and Hand Instrument in removing Gutta-percha and Sealer from Root Canals of Endodontically Treated Teeth.\(^13\)

CONCLUSION

From the above results, the authors concluded that none of the instruments were able to remove the filling material completely. Gutta percha removal using Neoendo retreatment files were faster and more efficient compared to REndo and H files.

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