

Assessment of Efficacy of Various Obturation Techniques used in Endodontic Therapy: A Comparative Study

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ABSTRACT

Introduction: Complete remove the irritants, pathogenic micro-organisms and other by-products from the root canal space followed by complete shaping and filling of pulp space with a bio-compatible material with appropriate obturating technique is necessary for the success of root canal therapy. Recent researches in the field of endodontic focuses mainly on the search of ideal obturating technique despite of prevalence of numerous techniques for obturating the canal space after completion of pulp therapy. Hence, we undertook the present study to assess the percentage of gutta-percha filled area (GFA) in the teeth filled with Thermafil technique, Warm Vertical Compaction (WC) technique and cold lateral condensation (CC) technique.

Material and Methods: The present study included assessment of a total of 75 permanent teeth. All the samples were divided randomly into three study groups. Group I, II and III included samples which were obturated using CC technique, Thermafil and WC technique respectively. Horizontal cutting and sectioning of the teeth 2 to 3 mm from the apex was done after the complete obturation procedure of the samples have been performed. Teeth samples were sectioned using double-diamond disc. Stereomicroscope was used for the assessment of prepared sections of the obturated teeth. Recording of the GFA was done using imaging system.

Results: In all the three groups, 25 samples were selected. Mean percentage of GFA in the samples of group A was 97.35 percent. The mean GFA in the group B samples was 96.85 percent. The mean GFA in the group C samples was 94.25 percent. Significant results were obtained (p -value <0.05) while comparing the mean GFA in between the group A samples and group C samples.

Conclusion: Minimum voids are exhibited by Thermafil obturation technique in comparison with other latest techniques.

Keywords: Cold condensation, Obturation, Thermafil, Warm condensation

INTRODUCTION

For the adequate success of root canal therapy, it is necessary to complete remove the irritants, pathogenic micro-organisms and other by-products from the root canal space followed by complete shaping and filling of pulp space with a bio-compatible material with appropriate obturating technique.¹ Complete obliteration of root canal space with a bio-compatible, non-toxic material for providing a hermetic seal is the primary goal of endodontic therapy.² Subsequent re-infection of the pulp space after endodontic therapy is provided in the final phase of endodontic therapy. i.e. Obturation.³ Recent researcher in the field of endodontic focus mainly for search of ideal obturating technique despite of prevalence of numerous techniques for obturating the canal space after completion of pulp therapy.⁴ Hence, we undertook the present study to assess the percentage of gutta-percha filled area (GFA) in the teeth filled with Thermafil technique, Warm Vertical Compaction (WC) technique and cold

lateral condensation (CC) technique.

MATERIAL AND METHODS

The present study was conducted in the department of endodontic of the institute and included assessment of permanent anterior teeth with single root canal and single root. A total of 75 permanent teeth were included in the present study and were analyzed. Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. Sodium hypochlorite was used for storing the teeth after collection. K-files were used for the initial preparation of the pulp canal space. Measurement of the initial working length was done using intra-oral peri-apical radiographs. Biomechanical preparation of the root canal was done to complete shape and prepare the pulp canals. After canal preparation, all the samples were divided randomly into three study groups. Group I, II and III included samples which were obturated using CC technique, Thermafil and WC technique respectively. All the obturation procedures were done without the use of sealers. Horizontal cutting and sectioning of the teeth 2 to 3 mm from the apex was done after the complete obturation procedure of the samples have been performed. Teeth samples were sectioned using double-diamond disc. Stereomicroscope was used for the assessment of prepared sections of the obturated teeth. Recording of the GFA was done using imaging system.

STATISTICAL ANALYSIS

All the results were analyzed by SPSS software. Chi-square test and one way ANOVA was used for the assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

Table 1 shows the distribution of GP filled areas in various study groups. In all the three groups, 25 samples were selected. Mean percentage of GFA in the samples of group A was 97.35 percent. The mean GFA in the group B samples was 96.85 percent. The mean GFA in the group C samples was 94.25 percent. Table 2 highlights the comparison of GP filled areas in various study groups. While comparing the mean GFA in between the group A and group B samples, significant results were obtained (p -value <0.05). While comparing the mean GFA in between the group B

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| Group | Number of samples | Mean percentage |
|-------|-------------------|-----------------|
| A | 25 | 97.35 |
| B | 25 | 96.85 |
| C | 25 | 94.25 |

Table-1: Distribution of mean percentage of GFA in various study groups

| Comparative evaluation | Mean difference | p-value |
|------------------------|-----------------|---------|
| Group A vs Group B | 1.352 | 0.01* |
| Group B vs Group C | 2.658 | 0.02* |
| Group A vs Group C | 3.684 | 0.04* |

*: Significant

Table-2: Comparison of GFA in various study groups

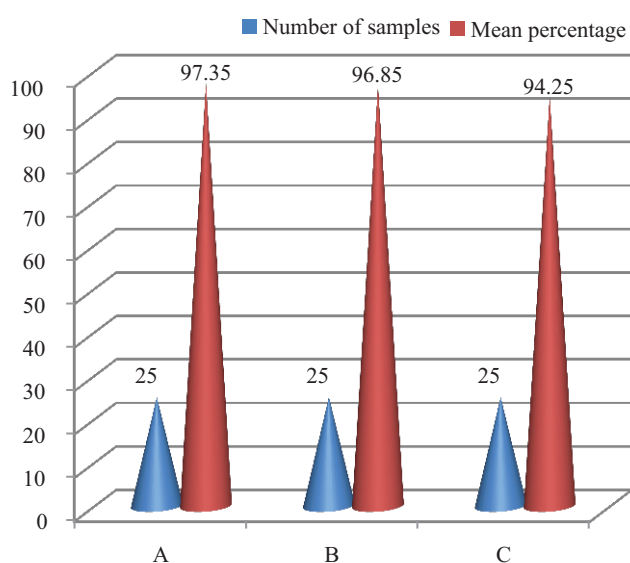


Figure-1: Distribution of mean percentage of GFA in various study groups

and group C samples, significant results were obtained (p-value < 0.05). Significant results were obtained (p-value < 0.05) while comparing the mean GFA in between the group A samples and group C samples.

DISCUSSION

Through cleaning and shaping of root canal space followed by its obliteration with a bio-compatible material is the key to success for the endodontic therapy.⁵ The purpose of the process of obturation is to completely seal the root canal space to prohibit the seepage of any material of fluid or micro-organisms into the peri-apical areas. All the techniques available for obturating teeth during the final phase of endodontic therapy have their own advantages and limitations.⁶⁻⁸ Hence, we undertook the present study to assess the percentage of gutta-percha filled area (GFA) in the teeth filled with Thermafil technique, WC technique and CC technique.

In the present study, we observed that in the cross-sections, some voids and gaps were visible despite of the presence of thorough density of the gutta-percha. We also observed that less percentage of GFA was shown by WC technique in comparison with the Thermafil technique. In the apical third of the cross-sections of the root canals, the percentage of GFA was assessed by Samadi et al using either Thermafil technique, Warm Vertical Condensation technique or Cold Lateral Condensation technique

without using sealers. They analyzed a total of 60 anterior permanent teeth. They divided all their samples into three study groups through randomization. All the three groups consisted of 20 samples each. Group I, group II and group III consisted of teeth obturated with Thermafil obturation technique, warm vertical condensation obturation technique and cold lateral condensation obturation technique respectively. Without the appropriate use of sealers, the obturation was performed with the help of specific obturating techniques. Horizontally and cross-section ally cutting of the obturated teeth was done at the distance of 2 to 3 mm from the root apex of the teeth. All the specimens were then analyzed under stereomicroscope. They observed that in between the group I and group II samples, maximum difference was obtained. From the results, they concluded that significantly higher percentage of GFA is produced by Thermafil Obturation technique.⁹

De Moor et al analyzed the efficacy of epoxy resin root canal sealer (AH26) when used for obturating teeth with different obturating techniques. They analyzed 75 teeth in 10 groups and 40 control teeth in one group. They prepared the root canals with the crown-down/step-back technique and using sodium hypochlorite. In all the cases AH26 was used as a sealer. All the teeth after the completion of pulp canal filling were divided into 5 study groups. They observed that in the time period of upto 4 months of observation, significantly higher leakage was found to be associated with Thermafil groups. From the results, they concluded that in comparison to the other four obturating techniques, hybrid gutta-percha condensation technique was to be superior.¹⁰ De-Deus et al evaluated the GFA in the teeth obturated with Thermafil or lateral condensation technique. They assessed 60 permanent maxillary central incisors which were filled with lateral condensation, System B or Thermafil system. All the three groups consisted of 20 samples each. Horizontal sections were prepared in each specimen at the distance of 2 to 3 mm from the tooth apex and were analyzed under microscope for the assessment of images obtained. They observed that in between the Thermafil System and both System B and lateral condensation techniques, significant differences were obtained while comparing the mean GFA. From the results, they concluded that significantly higher GFA occurs with Thermafil technique of obturation.¹¹

CONCLUSION

From the results, the authors concluded that minimum voids are exhibited by Thermafil obturation technique in comparison with other latest techniques. However, future studies are recommended.

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