

Original Research

Analysis of efficacy of two root canal obturation techniques

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ABSTRACT:

Background: To compare the efficacy of root canal obturation techniques. **Materials & methods:** A total of 10 subjects were enrolled. Obturation was done with 2 methods with 5 samples in each. The subjects were divided into 2 groups. Group II, the obturation was done with cold lateral condensation technique and in group I warm vertical condensation technique. The results were analysed using SPSS software. **Results:** In group I, the mean percentage of gutta-percha filled was 99.05% whereas in group II, the mean percentage of gutta-percha filled was 94.46%. **Conclusion:** Warm vertical condensation technique gives less voids and increased adaptation as compared to cold lateral obturation technique.

Keywords: Obturation, Gutta-percha, warm vertical condensation.

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INTRODUCTION

The formation of a three-dimensional seal is of fundamental importance in achieving long-term success following root canal therapy. Endodontic therapy includes several phases with specific goals. The first phase involves mechanical instrumentation and chemical irrigation of the root canal with the primary objective of eliminating infected tissue, microorganisms and their byproducts.¹ The next step is to perform obturation of the root canal system that leads to the formation of a three-dimensional and hermetic seal that is able to prevent any recontamination and also prevent periapical fluids to provide nourishment to microorganisms that survived cleansing and shaping procedures, in order to prevent possible multiplication.² In fact, it has been demonstrated that it is not possible to carry out complete cleaning and disinfection of the root canals because of the persistence of certain bacterial species.³ The aim of endodontic treatment is therefore to reduce bacterial populations to levels compatible with healing, followed by filling the root canal system with a material capable of creating a three-dimensional seal in order to prevent bacterial micro-infiltration, the main cause of reinfection and failure

of root canal treatment.^{4,5} Gutta-percha is considered the gold standard material for root canal fillings.⁶ Due to its superior properties, it allows a significantly lower percentage of voids (1.02%) compared to previously used materials.⁷

Although there are many techniques for obturation of root canals, but still search is on for better techniques, as cold lateral condensation (CLC) technique, the most frequently used technique and the standard with which all other techniques are compared, results in creation of voids, spreader tracts and lack of surface adaptation to canal walls.⁸ In recent years, a number of plasticized gutta-percha techniques have been introduced that have purported to seal the root canal better, like Warm Vertical Compaction technique (WVC) and Thermafil obturation technique which incorporate the use of thermal or frictional heat to plasticize the gutta-percha, allowing for better adaptation to canal walls, higher degree of homogeneity and provide optimum apical and coronal sealing when compared to lateral condensation.^{8,9} The WVC technique takes advantage of excellent gutta-percha filling as close as possible to the apex. Hence, this study was conducted to compare the efficacy of root canal obturation techniques.

MATERIALS & METHODS

A total of 10 subjects were enrolled. Obturation was done with 2 methods with 5 samples in each. The subjects were divided into 2 groups. Group II, the obturation was done with cold lateral condensation technique and in group I warm vertical condensation technique. A complete history was taken. After obturation, the radiographs were taken for the evaluation. Filling of the canals were evaluated using Chi- squared test. The results were analysed using SPSS software.

RESULTS

A total of 10 subjects were enrolled. The subjects were divided into two groups as in Group II, the obturation was done with cold lateral condensation technique and in group I warm vertical condensation technique. In group I, the mean percentage of gutta-percha filled was 99.05% whereas in group II, the mean percentage of gutta-percha filled was 94.46%. The voids were less in warm vertical condensation as compared to cold lateral condensation technique.

Table: mean percentage of gutta-percha filled area

Groups	No. of samples	Mean (%)	SD
Group I	5	99.05	0.15
Group II	5	94.46	0.61

DISCUSSION

The main purpose of endodontic treatment is to clean, shape and fill the root canal space thoroughly and prevent any interchange between the oral cavity, the root canal system and periradicular tissues, providing a barrier to reinfection. The success of endodontic treatment depends on adequate mechanical debridement of root canal and quality obturation with biocompatible material.⁹ Hence, this study was conducted to compare the efficacy of root canal obturation techniques.

In the present study, a total of 10 subjects were enrolled. The subjects were divided into two groups as in Group II, the obturation was done with cold lateral condensation technique and in group I warm vertical condensation technique. A study by Samadi F et al, maximum group difference was observed between groups I and III (3.558 ± 0.138) while minimum difference was observed between groups I and II (1.223 ± 0.137). Thus, all the between group differences were statistically significant. Thermafil Obturation technique produces significantly higher percentage of gutta-percha filled area (PGFA) than the warm vertical condensation technique or cold lateral condensation technique.¹⁰

In the present study, in group I, the mean percentage of gutta-percha filled was 99.05% whereas in group II, the mean percentage of gutta-percha filled was 94.46%. The voids were less in warm vertical condensation as compared to cold lateral condensation technique. Another study by Gupta R et al, a total of 30 central incisors were selected. Biomechanical preparation was done by Reciproc file no 25. Teeth

were divided into 3 groups of 10 teeth each according to the obturation technique i.e. Calamus, Thermafil and lateral compaction. The maximum amount of obturating material was observed in Calamus group followed by Thermafil and lateral compaction. Minimum voids were seen in obturation by Calamus technique. It can be concluded that Calamus may be a good obturation technique.¹¹ Previous studies have analyzed the quality of the obturation obtained through the use of systems based on plastic carriers (Thermafil). The results of these studies show that these systems produce a higher percentage of gutta-percha compared to other obturation techniques (System B, cold lateral condensation), with reduced working times compared to the lateral condensation technique.^{12,13} On the other hand, there is little information in the literature about carriers made of semi-rigid thermostable gutta-percha, such as the GuttaCore System. Among the most recent studies, the one conducted by Ruth Pérez-Alfayate et al. shows that these carriers, in particular the GuttaFusion and GuttaCore Systems, produce very homogeneous fillings, with a high percentage of areas filled with GuttaPercha and a low percentage of voids, respectively, at the coronal (GuttaFusion) and apical (GuttaCore) levels.^{14,15} Migliau G et al, compared the quality of the root canal obturation obtained with two different techniques, i.e., thermoplastic gutta-percha introduced through a carrier (GuttaCore) and fluid gutta-percha (GuttaFlow2). The study included 40 permanent single-rooted human teeth, divided into two groups and obturated with Guttaflow (group G) and with GuttaCore (group T). GuttaCore showed a better filling in the apical third of the canal with a percentage of voids equal to 5%. GuttaFlow showed a lower percentage of voids in the middle and coronal thirds of the canal, 1.6% of coronal voids. Statistical analysis showed a statistically significant difference in the percentage of voids in the two groups (GuttaCore and Guttaflow2) in each portion.¹⁶ The classic obturation technique, also primarily taught in undergraduate courses in most dental schools, is cold lateral condensation.¹⁷⁻¹⁹ This technique involves placing a single cone of gutta-percha (GP) with sealer in the prepared root canal and adding secondary GP cones that are compacted together with the use of a spreader. The cones stay together due to frictional grip and the presence of a sealer.²⁰ Although a time-consuming procedure, lateral condensation is preferred due to its low cost and controlled placement of GP in the canal.^{18,19} The final mass is not homogenous and consists of numerous GP cones pressed together with the sealer filling most spaces in between.²¹ The concept of heating GP to obtain a uniform tri-dimensional obturation was introduced by Schilder in the 1960s.²² He aimed to provide a technique that produced a homogenous, stable, compatible material adapted to the varied and complex anatomy of the root canal system. This technique condenses heated GP in the canal to adapt it

to the prepared root canal walls. The method uses little amount of sealer. Since the introduction of Schilder's technique, other procedures that use heated gutta-percha cones evolved: the continuous wave obturation, injectable gutta-percha, and carrier-based techniques.^{23,24}

CONCLUSION

Warm vertical condensation technique gives less voids and increased adaptation as compared to cold lateral obturation technique.

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