

Original Research

Cold lateral compaction condensation versus warm vertical compaction technique- A comparative study

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ABSTRACT:

Background: Gutta-percha is the most widely used and accepted obturation material because of its biocompatibility, inertness, dimensional stability, compactability, plasticity when heated. The present study compared warm vertical compaction and cold lateral compaction using continuous wave of condensation technique. **Materials & Methods:** 50 simulated curved root canals in transparent acrylic blocks instrumented. Two groups were prepared. In group I, cold lateral compaction was performed. In group II, warm vertical compaction was performed. **Results:** The mean weight of instrumented block in group I was 3.79 gram and in group II was 3.81 grams, mean weight of obturated block was 3.83 gram in group I and 3.86 grams in group II and mean weight of gutta-percha was 0.041 grams in group I and 0.58 grams in group II. The difference was significant ($P < 0.05$). **Conclusion:** Warm vertical compaction using the continuous wave of condensation technique resulted in a greater gutta percha fill by weight compared with standard cold lateral compaction.

Key words: Continuous wave, Gutta percha, Warm vertical compaction

Received: 12 October, 2021

Accepted: 17 November, 2021

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This article may be cited as: Midha V, Tandon S, Midha V, Kaur R. Cold lateral compaction condensation versus warm vertical compaction technique- A comparative study. *Int J Res Health Allied Sci* 2021; 7(6): 65-67.

INTRODUCTION

The main objectives of endodontic therapy are cleaning and shaping, disinfection, and obturation of the root-canal system in three dimensions.¹ Gutta-percha is the most widely used and accepted obturation material because of its biocompatibility, inertness, dimensional stability, compactability, plasticity when heated, and ease of removal for post placement or retreatment. Sealing the root canal system is an important step in root canal treatment for a successful outcome. Several techniques and materials have been introduced for a three-dimensional obturation with higher density and homogeneity.²

The ideal material to obturate these root canal systems should be non-irritating, free from volume change, nontoxic, radiopaque, easily manipulated, insoluble in tissue fluids, and adaptable to canal walls.³ Historically, gutta-percha has been the material of choice. The chemical and physical properties of gutta-percha make it amenable for use with many different obturation techniques. Lateral condensation has remained the most widely used gutta-percha

obturation technique. However, Brayton et al reported that this technique produced many irregularities in the final mass of gutta-percha. They also reported that lateral condensation did not reproduce canal fins and irregularities, that the surface of the material was frequently rough and pitted, and that there was an inadequate dispersion of sealer.⁴ In order to eliminate some of these problems, vertical condensation of warm gutta-percha has been advocated. Vertical compaction uses heat to produce a homogenous obturation that adapts well to the canal walls. This technique may result in the extrusion of gutta-percha into the periapical tissues and may be time consuming. Because of the disadvantages of these techniques, several variations have been developed.⁵ The present study compared warm vertical compaction and cold lateral compaction using continuous wave of condensation technique.

MATERIALS & METHODS

This invitro study was conducted using 50 simulated curved root canals in transparent acrylic blocks instrumented. After achieving working length, the

canal was irrigated with 1 ml of water between each instrument use, and on completion the canal was dried with paper points.

Two groups were prepared. In group I, cold lateral compaction was performed. In group II, warm vertical

compaction was performed. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of blocks

Groups	Group I	Group II
Method	Cold lateral compaction	Warm vertical compaction
Number	25	25

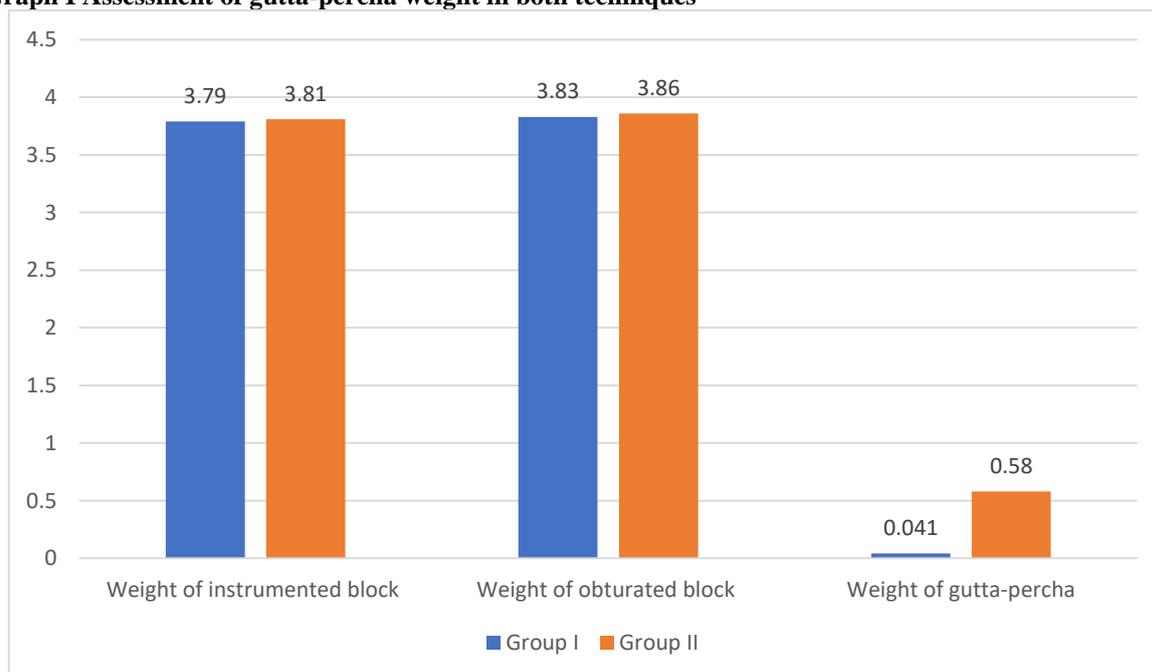
Table I shows that in group I, cold lateral compaction and in group II warm vertical compaction technique was used. Each group comprised of 25 blocks.

Table II Assessment of gutta-percha weight in both techniques

Parameters (g)	Group I	Group II	P value
Weight of instrumented block	3.79	3.81	0.91
Weight of obturated block	3.83	3.86	0.81
Weight of gutta-percha	0.041	0.58	0.001

Table II, graph I shows that mean weight of instrumented block in group I was 3.79 gram and in group II was 3.81 grams, mean weight of obturated block was 3.83 gram in group I and 3.86 grams in group II and mean weight of gutta-percha was 0.041 grams in group I and 0.58 grams in group II. The difference was significant (P < 0.05).

Graph I Assessment of gutta-percha weight in both techniques



DISCUSSION

Comparative studies have been performed to assess which gutta-percha technique produces the best adapted root canal filling.⁶ These studies have used gold artificial canals for standardization of canal size and also natural teeth which were decalcified and cleared after obturation.⁷ Warm gutta-percha methods have been shown to reproduce the internal root canal anatomy better than traditional lateral condensation.⁸ Newer methods using warm gutta-percha have been introduced using high- or low-temperature thermoplasticized injectable gutta-percha.

Cold lateral condensation, after being successfully tested and used, has set the golden standard in endodontics.⁹ However, it has been found that cold gutta-percha techniques rely heavily on a root canal sealer to address the problem of the accessory anatomy, as the core filling material will not move out of the main canal. Voids, spreader tracts, incomplete fusion of the gutta-percha cones, and lack of surface adaptation have been reported.¹⁰ The present study compared warm vertical compaction and cold lateral compaction using continuous wave of condensation technique.

In present study, in group I, cold lateral compaction and in group II warm vertical compaction technique was used. Each group comprised of 25 blocks. Anantula et al¹¹ compared the sealing ability between the conventional cold lateral condensation technique and two different obturating techniques - Obtura II and Gutta Flow under a stereomicroscope at 40^x magnification. Sixty single-rooted teeth were selected and the canals were shaped with ProTaper rotary files. Irrigation was performed with 5% sodium hypochlorite and 17% EDTA. The teeth were then separated into three groups depending on the type of obturation technique. Group A (n = 20) - obturated using the Lateral condensation technique and AH plus sealer, Group B (n = 20) - obturated with Obtura II injection-molded thermoplasticized technique and AH plus sealer, and Group C (n = 20) obturated using Gutta Flow. After storing the teeth in 100% humidity for seven days at 37^oC, the roots of the teeth were sectioned at five levels. The sections were then observed under a stereomicroscope at 40 × magnification and the images were analyzed for area of voids (AV) and frequency of voids. The lowest mean of AV was recorded in the Obtura II group, 1.0% (95% CI = 0.5 - 1.5). This was statistically and significantly different from the Gutta Flow group, 3.0% (95% CI = 2.1 - 3.9). There was no significant difference between the Obtura II group and the lateral condensation group, 1.6% with regard to the area of voids, but there was a statistically significant difference between the Lateral condensation and Gutta Flow groups. The Gutta Flow group showed the maximum number of voids, 56% which was significantly higher than those in the lateral condensation, 26% and Obtura II, 15% groups. We observed that mean weight of instrumented block in group I was 3.79 gram and in group II was 3.81 grams, mean weight of obturated block was 3.83 gram in group I and 3.86 grams in group II and mean weight of gutta-percha was 0.041 grams in group I and 0.58 grams in group II. Gandhi et al¹² evaluated and compared the efficacy of different obturating methods used in primary teeth. Forty- one patients aged four to nine years with a total of 60 teeth were selected. Out of the 60 teeth, 32 were primary mandibular first molars and 28 were primary mandibular second molars, the sample was randomly divided into three groups. Disposable syringe, lentulo spiral and past inject were used for obturation. Postoperative evaluation was done for; quality of canal obturation, presence of voids using postoperative radiographs following obturation of teeth. Among the three groups of the study, past inject exhibited the maximum number of optimally filled

canals. Maximum number of underfilled canals was found with lentulospiral, and the maximum number of overfilled canals was seen with disposable syringe. Least number of voids was observed in canals filled with the past inject technique and disposable syringe.

CONCLUSION

Authors found that warm vertical compaction using the continuous wave of condensation technique resulted in a greater gutta percha fill by weight compared with standard cold lateral compaction.

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