

ORIGINAL ARTICLE

Comparative evaluation of sealing efficacy of Thermafil and Obtura II obturating techniques: An in- vitro study

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ABSTRACT:

Background: Success of root canal therapy depends upon the accuracy by which, its component steps are being performed. Hence; we planned the present study to assess and compare the efficacy of obtura II and Thermafil obturating techniques.

Materials & methods: The present study included assessment of efficacy of two different obturating techniques. We analysed a total of 80 extracted single rooted maxillary incisors and resected their anatomic crown portions. Polishing and painting of the root was done followed by drying. Storing of the tooth specimens was done after biomechanical preparation and was divided into two study groups with 40 teeth in each group. One group comprised of specimen in which obturation was done by Obtura II technique while the second group comprised of specimens in which Thermafil technique was used. Spectrophotometric Analysis was accomplished using light spectrophotometry. All the results were analysed by SPSS software. **Results:** The mean microleakage in the thermafil group was found to be 0.0245 while the mean microleakage in the Obtura II group was found to be 0.0020 respectively. We observed significant difference while comparing the mean micro-leakage in the specimens of both the study groups. **Conclusion:** Significant difference exists in between the obtura II and Thermafil obturating technique, in terms of mean micro-leakage.

Key words: Lateral Condensation, Obturation, Thermafil

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INTRODUCTION

An ideal root canal filling should fill the entire root canal system in three dimensions and form a homogenous mass.¹⁻³ Warm vertical (WV) compaction of gutta-percha was proposed in the 1960s, and this technique has been shown to lead to satisfactory results in terms of homogeneity and to fill a high percentage of the root canal area with gutta-percha material.^{4,5} However, the armamentarium required for this technique is considerably more expensive than is required for cold lateral (CL) compaction. Another criticism of this thermoplasticized technique is that apical control of the filling material can be difficult at times, and some material may be extruded beyond the apical foramen.⁶⁻⁸ In thermafil technique, a metal carrier is used to transport the gutta-percha to working length, then compacted using a single insertion motion.⁹ Hence; we planned the present study to assess and compare the efficacy of obtura II and Thermafil obturating techniques.

MATERIALS & METHODS

The present study was conducted in the department of endodontic of the dental institute and included assessment of efficacy of two different obturating techniques. Ethical

approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. We analysed a total of 80 extracted single rooted maxillary incisors and resected their anatomic crown portions. Polishing and painting of the root was done followed by drying. Estimation of the working length was done using peri- apical radiographs. Complete cleaning of the root canal was done using files. Continuous irrigation of the root canals was done during the biomechanical preparation process. Storing of the tooth specimens was done after biomechanical preparation and was divided into two study groups with 40 teeth in each group. One group comprised of specimen in which obturation was done by Obtura II technique while the second group comprised of specimens in which Thermafil technique was used. Initially each tooth was dissolved in 50% (10 ml) of nitric acid and the liquid obtained was analyzed under spectrophotometer for the volume of methylene blue present which is directly proportional to the optical density (amount of light absorbed). Spectrophotometric Analysis was accomplished using light spectrophotometry. All the results were analysed by SPSS software. Chi- square test and student t test were used for assessment of level of

significance. P- value of less than 0.05 was taken as significant.

RESULTS

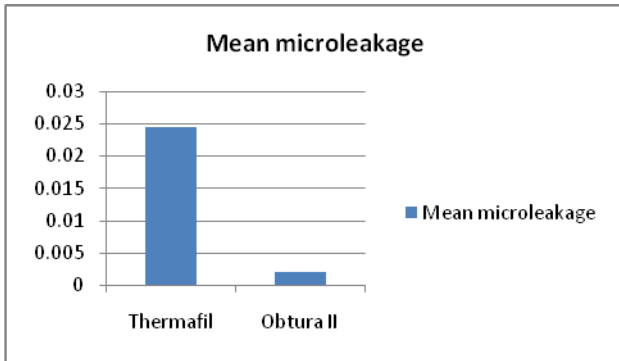
Table 1 shows the comparison of mean microleakage in both the study groups. The mean microleakage in the thermanfil group was found to be 0.0245 while the mean microleakage in the Obtura II group was found to be 0.0020 respectively. We observed significant difference while comparing the mean micro-leakage in the specimens of both the study groups. **Graph 1** highlights the mean microleakage in both the study groups

Table 1: Comparison of mean microleakage in both the study groups

Group	Number of samples	Mean microleakage	p- value
Thermanfil	40	0.0245	0.04 (S)
Obtura II	40	0.0020	

S: Significant

Graph 1: Mean microleakage in both the study groups



DISCUSSION

In the present study, we observed statistically significant difference on comparing the microleakage in both the study groups (**Table 1**). **Ho ES et al** compared the density of gutta-percha root fillings obturated with the following techniques: cold lateral (CL) compaction, ultrasonic lateral (UL) compaction, and warm vertical (WV) compaction. Thirty-three extracted mandibular first molars, with two separate mesial canals in each, were selected. After instrumentation, the canals were stratified into three groups based on canal length and curvature, and underwent obturation with one of the techniques. No sealer was used in order to avoid masking any voids. The teeth were imaged pre- and post-obturation using micro-computed tomography. The reconstructed three-dimensional images were analyzed volumetrically to determine the amount of gutta-percha present in every 2 mm segment of the canal. P values < 0.05 were considered to indicate statistical significance. The overall mean volume fraction of gutta-percha was 68.51 ± 6.75% for CL, 86.56 ± 5.00% for UL, and 88.91 ± 5.16% for WV. Significant differences were found between CL and UL and between CL and WV (p < 0.05), but not between UL and WV (p = 0.526). The gutta-percha density of the roots treated with WV and UL increased towards the

coronal aspect, but this trend was not noted in the CL group. WV compaction and UL compaction produced a significantly denser gutta-percha root filling than CL compaction. The density of gutta-percha was observed to increase towards the coronal aspect when the former two techniques were used.¹⁰ Anantula K et al evaluated and 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 40x 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 AHplus sealer, and Group C (n = 20) obturated using GuttaFlow. After storing the teeth in 100% humidity for seven days at 37°C, 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 data was statistically analyzed using the SPSS version 17 software. The 95% confidence intervals (CI) were calculated. One-way analysis of variance with post-hoc test and non-parametric Mann-Whitney U test was carried out, to compare the means. 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 GuttaFlow 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% (95% CI= 1.0 - 2.2) with regard to the area of voids, but there was a statistically significant difference between the Lateral condensation and GuttaFlow groups. The GuttaFlow group showed the maximum number of voids, 56% (95% CI = 48 - 64), which was significantly higher than those in the lateral condensation, 26% (95% CI= 19 - 34), and Obtura II, 15% (95% CI= 10 - 21) groups. The Obtura II technique utilizing the injection-molded thermoplasticized gutta-percha had better adaptability to the canal walls when compared to the Gutta Flow obturation and lateral condensation techniques.¹¹ Gençoğlu N et al calculated the core (gutta-percha or gutta-percha and carrier)/sealer ratio and the sealing ability for 4 different gutta-percha techniques: Thermanfil, JS Quick-Fill, System B, and lateral condensation. One hundred single-rooted teeth were instrumented and obturated. Forty of the teeth were embedded in resin and sectioned horizontally at 1, 2,3, and 4 mm from the anatomic apex. Photographs were taken of each section, and the total area of the canal filled with core material or sealer was calculated. Sixty of the teeth were kept in wet storage for 90 days, after which the teeth were immersed in 2% methylene blue for 48 hours. The length of dye penetration was measured. Roots obturated with Thermanfil and JS Quick-Fill contained significantly more core material than did those obturated with System B or

with lateral condensation. The lateral condensation technique had the lowest core/sealer ratio ($P < .05$). Roots using Thermafil and Quick-Fill showed significantly less dye leakage than did the lateral condensation technique. Through use of these techniques in vitro, Thermafil and JS Quick-Fill with carrier and System B were found to be superior to the lateral condensation technique in terms of core/sealer ratio. Thermafil and Quick-Fill were superior to lateral condensation in terms of dye leakage.¹²

CONCLUSION

Significant difference exists in between the obtura II and Thermafil obturating technique, in terms of mean micro-leakage. However, future studies with more parameters and larger sample size are required.

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