

## ORIGINAL RESEARCH

### Evaluation of efficacy of two different root canal obturation techniques used during root canal therapy

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#### ABSTRACT:

**Background:** Sealing the root canal system is an important step in root canal treatment for a successful outcome. Complete obliterating of root canal space with a bio-compatible, nontoxic material for providing a hermetic seal is the primary goal of endodontic therapy. Hence; the present study was undertaken for evaluating the efficacy of two different root canal obturation techniques used during root canal therapy. **Materials & methods:** A total of 40 freshly extracted maxillary canines were included. All the specimens were divided into two study groups as follows: Group A: Thermafil obturation technique group, and Group B: Cold lateral condensation obturation technique group. All the specimens were sectioned at the level of cement-enamel junction and root canal therapy was carried out according to their respective groups. After obturation, the teeth were cross-sectioned horizon-tally at 2 to 3 mm from apex with the help of double-sided diamond disk. Color studies of sections were taken using a Stereomicroscope at magnification of 50×. **Results:** Mean percentage of gutta-percha filled area among specimens of group A and group B was 99.10% and 96.37 % respectively. While analysing statistically, it was observed that mean gutta-percha filled area was significantly higher among specimens of group A. **Conclusion:** Thermafil obturation technique had significantly higher efficacy in comparison to cold lateral condensation obturation technique.

**Key words:** Root canal therapy, Obturation,

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#### INTRODUCTION

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. Void-free filled canals carry a lower risk of apical periodontitis. Gutta-percha has long been used as a popular root filling material. The chemical and physical properties of gutta percha enable its application in several obturation techniques. Complete obliterating of root canal space with a bio-compatible, nontoxic material for providing a hermetic seal is the primary goal of endodontic therapy. Subsequent re-infection of the pulp space after endodontic therapy is provided in the final phase of endodontic therapy. i.e. Obturation. 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.<sup>1-3</sup>

Cold LC is a successful technique due to its simplicity, not requiring specific and expensive instruments and low cost. Disadvantages of this technique include risk of void formation, inadequate adaptation of root filling material to the root canal walls and partial filling in certain hard-to-reach areas of the root canal system.<sup>4-6</sup> Hence; the present study was undertaken for evaluating the efficacy of two different root canal obturation techniques used during root canal therapy.

#### MATERIALS & METHODS

The present study was conducted for assessing the efficacy of two different root canal obturation techniques used during root canal therapy. A total of 40 freshly extracted maxillary canines were included. All the specimens were divided into two study groups as follows: Group A: Thermafil obturation technique group, and Group B: Cold lateral condensation obturation technique group

All the specimens were sectioned at the level of cement-enamel junction and root canal therapy was carried out according to their respective groups. After obturation, the teeth were cross-sectioned horizontally at 2 to 3 mm from apex with the help of double-sided diamond disk. Color studies of sections were taken using a Stereomicroscope at magnification of 50×. Mean percentage of gutta percha filled area was assessed. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

**RESULTS**

In the present study, a total of 40 freshly extracted maxillary canines were included. All the specimens were divided into two study groups as follows: Group A: Thermafil obturation technique group, and Group B: Cold lateral condensation obturation technique group. Mean percentage of gutta-percha filled area among specimens of group A and group B was 99.10% and 96.37 % respectively. While analysing statistically, it was observed that mean gutta-percha filled area was significantly higher among specimens of group A.

**Table 1:** Comparison of mean gutta-percha filled area (%)

Group	Mean (%)	SD
Group A	99.10	0.58
Group B	96.37	0.78
p-value	0.00 (Significant)	

**DISCUSSION**

Successful endodontic therapy is critically dependent on the thorough removal of microorganisms and their by-products through mechanical root canal instrumentation, antibacterial irrigation and adequate filling of the root canal space. The goal of root canal filling is to completely obliterate the canal space with a stable, nontoxic material and at the same time creating a hermetic seal to prevent the movement of tissue fluids, bacteria or bacterial by-products through the filled canal. Obturation provides a seal that prevents reinfection of the canal and subsequent leakage into the periradicular tissues.<sup>7- 11</sup> Hence; the present study was undertaken for evaluating the efficacy of two different root canal obturation techniques used during root canal therapy.

In the present study, a total of 40 freshly extracted maxillary canines were included. All the specimens were divided into two study groups as follows: Group A: Thermafil obturation technique group, and Group B: Cold lateral condensation obturation technique group. Mean percentage of gutta-percha filled area among specimens of group A and group B was 99.10% and 96.37 % respectively. Samadi F et al evaluated the percentage of gutta-percha-filled area (PGFA) using microscopic analysis of the cross-sections in the apical third of root canals when filled either with Thermafil technique, Warm Vertical Condensation technique and Cold Lateral Condensation technique without using sealers. Sixty single rooted extracted per-manent teeth were collected. After crown amputation, the teeth were randomly divided

into three experimental groups of 20 specimens each. Group I–Thermafil obturation technique, group II–warm vertical condensation obturation technique and group III–cold lateral condensation obturation technique. Obturation was performed by specific techniques without using sealers. After obturation, the teeth were cross-sectioned horizontally at 2 to 3 mm from apex with the help of double sided diamond disk. Using a KS 100 imaging system the area of canals and the gutta-percha was recorded, also the percentage of gutta-percha filled area (PGFA) was calculated. Maximum group difference was observed between groups I and III ( $3.558 \pm 0.138$ ) while minimum difference was observed between groups I and II ( $1.223 \pm 0.137$ ). Their study supported the belief that the Thermafil Obturation technique produces significantly higher percentage of gutta-percha filled area (PGFA) than the warm vertical condensation technique or cold lateral condensation technique.<sup>10</sup> Ayca Yilmaz et al evaluated the efficacy of different obturation techniques in root canals instrumented either by hand or rotary instruments with regard to the percentage of gutta-percha-filled area (PGFA). One hundred and sixty extracted mandibular premolars with single, straight root canals were studied. Root canals were prepared to an apical size of 30 by hand with a modified crown-down technique or the ProTaper and HEROShaper systems. Teeth were divided into eight groups (n=20) according to the following instrumentation and obturation techniques: G1: Hand files+lateral condensation (LC), G2: Hand files+Thermafil, G3: ProTaper+LC, G4: ProTaper+single-cone, G5: ProTaper+ProTaper-Obturator, G6: HEROShaper+LC, G7: HEROShaper+single-cone, G8: HEROShaper+HEROfill. Horizontal sections were cut at 1, 3, 5, 7, 9, 11 and 13 mm from the apical foramen. A total of 1120 sections obtained were digitally photographed under a stereomicroscope set at 48X magnification. The cross-sectional area of the canal and the gutta-percha was measured by digital image analysis and the PGFA was calculated for each section. The mean of the PGFA in Thermafil (G2), ProTaper-Obturator (G5) and HEROfill (G8) groups was significantly higher than the other groups. In G3 and G4, PGFA showed no significant difference in the apical segments whereas PGFA was significantly higher at the middle and coronal segments in G3. In G6 and G7, PGFA showed no significant difference in the apical and middle segments whereas PGFA was significantly higher at the coronal segments in G6. The carrier-based gutta-percha obturation systems revealed significantly higher PGFA in comparison to single-cone and lateral condensation techniques.<sup>11</sup> In the present study, while analysing statistically, it was observed that mean gutta-percha filled area was significantly higher among specimens of group A. G De-Deus et al determined the percentage of gutta-percha-filled area (PGFA) in the apical third of root canals when filled with either Thermafil, System B or lateral condensation. Sixty extracted human maxillary central incisor teeth were root filled as following: G1: lateral condensation (n = 20), G2: System B (n = 20) and G3:

Thermafil system (n = 20). A horizontal section was cut 2 and 4 mm from the apical foramen of each tooth. The samples were prepared for microscopic analysis and photomicrographs of each apical surface were taken at a magnification of 50x. Through digital image analysis, the cross-sectional area of the canal and the gutta-percha was measured. The PGFA was calculated. The PGFA data obtained in the three groups were analysed using a nonparametric Friedman and Wilcoxon signed-rank tests. Significant differences in PGFA were found between the Thermafil System (G3) and both System B (G2) and lateral condensation (G1) ( $P < 0.01$ ). The greatest PGFA occurred in the Thermafil group. No significant statistical difference was found between System B and lateral condensation ( $P > 0.05$ ). The coated carrier gutta-percha system Thermafil produced significantly higher PGFAs than lateral condensation and System B techniques.<sup>12</sup>

### CONCLUSION

From the above results, the authors concluded that Thermafil obturation technique had significantly higher efficacy in comparison to cold lateral condensation obturation technique.

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