

Original ARTICLE

To assess efficacy of different obturation technique for root canal treatment- An in-vitro study

Asma Altaf¹, Nuzhat Mir², Mansha Jeelani²

¹Private consultant (MDS, Endodontist), J & K, ²Private Consultant (BDS), J & K

ABSTRACT

Background: Successful endodontic therapy is critically dependent on the thorough removal of microorganisms and their by-products. The present study was conducted to assess efficacy of different obturation technique for root canal treatment. **Materials & Methods:** The present in vitro study was conducted on 90 single rooted extracted permanent teeth. Teeth were divided into 3 groups of 30 each. Group I used thermafil obturation technique, group II used warm vertical condensation obturation technique and group III used cold lateral condensation obturation technique. The percentage of gutta-percha filled area (PGFA) was calculated. **Results:** The mean percentage gutta percha filled area in group I was 98.3%, in group II was 97.1% and in group III was 95.2 %. The difference was significant ($P < 0.05$). **Conclusion:** Authors found that thermafil obturation technique had maximum gutta percha filled area than warm vertical condensation obturation and cold lateral condensation obturation technique.

Key words: Thermafil, Obturation, lateral condensation

Corresponding author: Dr. Nuzhat Mir, Private Consultant (BDS), J & K

This article may be cited as: Altaf A, Mir N, Jeelani M. To assess efficacy of different obturation technique for root canal treatment- An in-vitro study. HECS Int J Comm Health Med Res 2019; 5(1):69- 71.

INTRODUCTION

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 re-infection of the canal and subsequent leakage into the periradicular tissues.¹

There are many techniques for obturation of root canals. Lateral compaction produces a cold-welded, non uniform mass of gutta-percha (GP) cones in the coronal, middle, and apical portion of the canal without perfect replication of the canal, leaving space filled with sealer. Teeth obturated with cold lateral compaction (CLC) and different sealers exhibited leakage following minimal storage in saliva.²

Warm vertical compaction (WVC) can increase the GP mass density and homogeneity on previous CLC obturations. The WVC technique has shown greater ability to flow into canal

irregularities. A 10% higher healing rate was also reported with WVC versus CLC for teeth with previous apical periodontitis. However, negotiating curved RSCs with pluggers and/or GP injection needles can be difficult. Thus, warm lateral compaction (WLC) was developed to enhance GP flow while maintaining the predictability and ease of use of traditional lateral compaction. WLC using an electrically heated spreader increased the homogeneity and density of the GP mass and maximized the advantages of both traditional lateral compaction and WVC.³ The present study was conducted to assess efficacy of different obturation technique for root canal treatment.

MATERIALS & METHODS

The present in vitro study was conducted in the department of Endodontics. It comprised of 90 single rooted extracted permanent teeth. Ethical approval for the study was taken beforehand. Teeth were divided into 3 groups of 30 each. Group I used thermafil obturation technique, group II used warm vertical condensation obturation technique and group III used cold lateral condensation obturation technique.

Following obturation, the teeth were cross-sectioned horizontally at 2 to 3 mm from apex. Sections were digitally photographed and measured under Stereomicroscope at magnification of 50X. Using a KS 100 imaging system the area of canals and the gutta-percha and the percentage of gutta-percha filled area (PGFA) was calculated. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I shows that group I used thermafil obturation technique, group II used warm vertical condensation obturation technique and group III used cold lateral condensation obturation technique. Each group had 30 teeth each.

Table I Distribution of teeth

Groups	Group I	Group II	Group III
Technique	Thermafil	Warm vertical	Cold lateral
Teeth	30	30	30

Table II Gutta-percha filled area in different study groups

Groups	Mean (%)	P value
Group I	98.3	0.04
Group II	97.1	
Group III	95.2	

Table II, graph I shows that mean percentage gutta percha filled area in group I was 98.3%, in group II was 97.1% and in group III was 95.2 %. The difference was significant (P< 0.05).

Graph I Gutta-percha filled area in different study groups

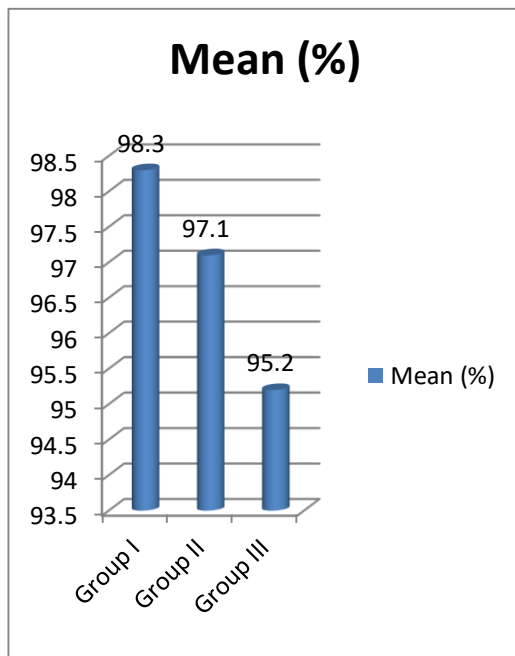


Table III Between group comparisons of percentage of gutta-percha filled area

Comparison	Mean difference	P value
Group I vs Group II	1.2	0.04
Group I vs Group III	3.2	0.001
Group II vs Group III	1.9	0.01

Table III shows between group comparisons of percentage of gutta-percha filled area shows significant difference between all groups (P< 0.05).

DISCUSSION

Endodontic treatment plays an important role in providing patients with high quality comprehensive dental care. The objective of canal filling in root canal treatment (RCT) is to prevent any communication between the oral cavity and the peri-apical tissues.⁴ The ingress of oral or tissue fluids via such communication may maintain the viability of any residual bacteria that survive the treatment. At the conclusion of endodontic therapy, the root canal space, including the patent accessory canals and multiple foramina, must be completely and densely filled with a biologically inert material. Most obturation methods make use of a solid core material cemented into the canal with a sealer.⁵ Gutta-percha and root canal sealer are currently the obturation materials of choice, but they can be used in a variety of ways to obturate root canals. Success or prognosis of root canal treatment depends on many variables. Among these is the technical quality of the root canal filling. The method of canal preparation and the length of the root canal fillings, relative to the radiographic apex significantly affect success of conventional root canal therapy.⁶

Researchers have evaluated the quality of the apical sealing using dye or radioisotope penetration, bacterial leakage, electrochemistry methods and through fluid transport. The method most frequently used is dye penetration.⁷ Despite its popularity, ease of use and the huge amount of studies on it, dye leakage has several negative aspects that allow a high variety of results from similar experiments. This methodological model is subjective, less comparative, with a low reproduction capacity and lack of reliable statistical results.^{8,9} The present study was conducted to assess efficacy of different obturation technique for root canal treatment. In present study, we included 90 single canal teeth which were divided into 3 groups. Group I used thermafil obturation technique, group II used warm vertical condensation obturation technique and group III used cold lateral condensation obturation technique. Each group had 30 teeth each.

Lipski¹⁰ 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 permanent teeth were collected. 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. Sections were digitally photographed and measured under Stereomicroscope at

magnification of 50X. 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.

In present study, mean percentage gutta percha filled area in group I was 98.3%, in group II was 97.1% and in group III was 95.2%. The difference was significant ($P < 0.05$). Between group comparisons of percentage of gutta-percha filled area shows significant difference between all groups ($P < 0.05$).

CONCLUSION

Authors found that thermafil obturation technique had maximum gutta percha filled area than warm vertical condensation obturation and cold lateral condensation obturation technique.

REFERENCES

1. Littman SH. Evaluation of root canal debridement by use of radiopaque medium. *J Endod* 1977 Apr;3(4):135-138.
2. Peters DD. Two-year in vitro solubility evaluation of four gutta-percha sealer obturation techniques. *J Endod* 1986 Apr;12(4):139-145.
3. Georgopoulou MK (Department of Endodontics, Dental School, Athens, Greece), Wu M-K, Nikolaou A, Wesselink PR. Effect of thickness on the sealing ability of some root canal sealers.
4. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995 Sep;80(3):338-344.
5. Gordon MP, Love RM, Chandler NP. An evaluation of 0.06 tapered gutta-percha cones for filling of 0.06 taper prepared curved root canals. *Int Endod J* 2005 Feb;38(2):87-96.
6. Xu Q, Ling J, Cheung GS, Hu Y. A quantitative evaluation of sealing ability of 4 obturation techniques by using a glucose leakage test. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007 Oct;104(4):e109-e113.
7. Venturi M, Breschi L. Evaluation of apical filling after warm vertical gutta-percha compaction using different procedures. *J Endod* 2004 Jun;30(6):436-440.
8. Guigand M, Glez D, Sibayan E. Comparative study of two canal obturation techniques by image analysis and EDS microanalysis. *Br Dent J* 2005; 11; 198:707-11.
9. Chu CH, Lo EC, Cheung GS. Outcome of root canal treatment using Thermoplasticized guttapercha and cold lateral condensation filling techniques. *Int Endod J* 2005; 38:179-85.
10. Levitan ME, Himel VT, Luckey JB. The effect of insertion rates on fill length and adaptation of a thermoplasticized guttapercha technique. *J Endod.* 2003;29:505-8.
11. Lipski M. Studies comparing the efficacy of root canal filling with gutta-percha lateral condensation and Thermoplasticized guttapercha obturators. *Ann Acad Med Stetin* 2000;46:317-30.