

Comparison of Obturation Density of Root Canals by Conventional Lateral Condensation Technique and Mechanical Lateral Condensation

Nutan Hanumant Gutte^{1*} Lalit Dattu Darade² Snehal Pundlikrao Ughade³ Pranjali Naresh Patil⁴
Sonali Vitthalrao Gite⁵ Ajay Balbhimrao Kute⁶

¹PG Student, Department Conservative Dentistry and Endodontics, Aditya Dental College, Beed, Maharashtra, India.

²PG Student, Department Conservative Dentistry and Endodontics, Aditya Dental College, Beed, Maharashtra, India.

³PG Student, Department Conservative Dentistry and Endodontics, Aditya Dental College, Beed, Maharashtra, India.

⁴PG Student, Department Conservative Dentistry and Endodontics, Aditya Dental College, Beed, Maharashtra, India.

⁵PG Student, Department Conservative Dentistry and Endodontics, MIDSR Dental College, Latur, Maharashtra, India.

⁶PG Student, Department Conservative Dentistry and Endodontics, MIDSR Dental College, Latur, Maharashtra, India.

ABSTRACT

Background: The goal of root canal filling is to completely obliterate the canal space with a stable, nontoxic material whilst at the same time creating a hermetic seal to prevent the movement of tissue fluids, bacteria or bacterial by-products through the filled canal. Hence; we compared the weight of root canal filling material by mechanical lateral condensation technique and conventional lateral condensation technique.

Materials and methods: The study was conducted in the department of Conservative dentistry and Endodontics of the Dental institution. For the study, we selected 100 extracted permanent maxillary central incisors with single canal and completed apex. We kept the teeth immersed in normal saline from the day of extraction to the day commencing the study. In group A, the obturation was performed using conventional lateral condensation technique (LC) employing finger spreaders and in group B, the obturation was done using mechanical lateral condensation technique (MLC) employing a reciprocating handpiece for creating space for accessory cones. All of the roots were weighted before and after obturation and the difference demonstrated the weight of gutta percha mass.

Results: A total of 100 extracted maxillary central incisors were used in the study. Teeth were randomly grouped into two groups with 50 teeth in each group. Teeth were weighed before and after the completion of obturation. The mean weight of gutta percha for Group A was 13.45 ± 2.9 g and Group B was 9.02 ± 1.9 g. The difference was statistically significant.

Conclusion: Within the limitations of the study we conclude that Mechanical lateral condensation technique is superior to conventional lateral condensation technique in obturation of endodontic canals.

Keywords: reciprocating handpiece, spreaders

INTRODUCTION

The goal of root canal filling is to completely obliterate the canal space with a stable, nontoxic material whilst at the same time creating a hermetic

seal to prevent the movement of tissue fluids, bacteria or bacterial by-products through the filled canal. To date the material most used in endodontics is gutta-percha in combination with a root canal sealer. The sealer provides the seal, not

Received: Nov. 4, 2018; Accepted: Jan. 20, 2019

*Correspondence Dr. Nutan Hanumant Gutte.

Department Conservative Dentistry and Endodontics, Aditya Dental College, Beed, Maharashtra, India.

Email: Not Disclosed

the gutta-percha, yet it has been reported that some sealers shrink upon setting whilst others are susceptible to breakdown.^{1,2} Therefore, the amount of sealer should be kept to a minimum and only be found in a thin layer between gutta-percha and the wall of the canal.³ The capability of an endodontic filling technique to ensure the filling of thin and irregular ramifications is an important clinical parameter and may represent a favorable aspect of the filling technique.⁴ Different techniques have been proposed over the years, and several in vitro models have been proposed to compare the results of these filling techniques. For this purpose, artificial lateral canals were created using various methods.⁵ Considering the high number of in vitro techniques proposed over the years, a model with main and various lateral canals would be an important tool with which to investigate and compare filling techniques.⁶

MATERIALS AND METHODS

The study was conducted in the department of Conservative dentistry and Endodontics of the Dental institution. The ethical approval for the study was obtained from ethical committee of the institute before beginning the study. For the study, we selected 100 extracted permanent maxillary central incisors with single canal and completed apex. Teeth with morphological and developmental anomalies were excluded from the study. We kept the teeth immersed in normal saline from the day of extraction to the day commencing the study. The crowns of the teeth were cut off using a slow speed disc bur. The working length of all the teeth was standardized to 19mm. Biomechanical preparation (BMP) of the roots was done using hand K-files. The prepared teeth were randomly grouped into 2 groups with 50 teeth in each group, Group A and Group B. In group A, the obturation was performed using conventional lateral condensation technique (LC) employing finger spreaders and in group B, the obturation was done using mechanical lateral condensation technique (MLC) employing a reciprocating handpiece for the same. The procedures on both the groups were performed by same operator to avoid any discrepancies.

The obturation was done using size 30 gutta-percha master cone and size 15 gutta-percha accessory cones for both the groups. The weight of the

obtured teeth was measured again. The difference between the weight of teeth before and after the obturation showed the weight of gutta percha mass. The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

Table 1: Comparative analysis of mean gutta percha weight between both techniques

Groups	Mean Gutta Percha weight	p-value
Group A (Mechanical lateral condensation technique)	13.45 ± 2.9 g	0.001
Group B (Conventional lateral condensation technique)	9.02 ± 1.9 g	

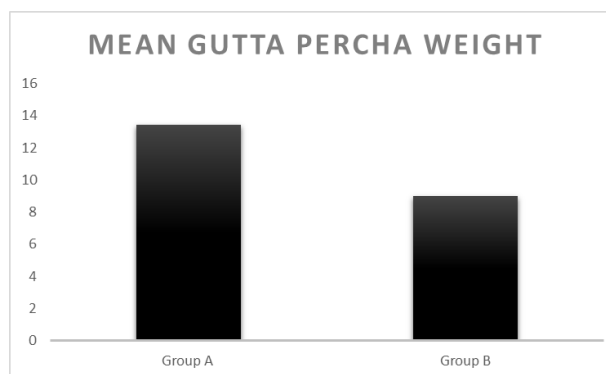


Fig 1: Analysis of mean gutta-percha weight between both techniques.

A total of 100 extracted maxillary central incisors were used in the study. Teeth were randomly grouped into two groups with 50 teeth in each group. Teeth were weighed before and after the completion of obturation. The difference between initial and final weight after obturation of teeth was calculated and a list was formulated for both the groups. The mean weight of gutta percha for Group A was **13.45 ± 2.9 g** and Group B was **9.02 ± 1.9 g**. The difference in weight of both the groups was

statistically significant with a p value of 0.02. [Table 1 and Figure 1]

DISCUSSION

In the present study, we observed that mean weight of Gutta-percha was significantly higher in Group MLC as compared to Group LC depicting that density of gutta-percha is more efficient with MLC technique. The results were statistically significant. The results were compared with previous studies and results were consistent with previous studies. Liewehr FR et al⁷ studied density of gutta-percha after warm lateral condensation. In group A, simulated straight root canals in 30 transparent acrylic blocks were instrumented and obturated with gutta-percha without sealer using standard lateral condensation. The zap and tap method of warm lateral condensation was then used on the same 30 canals which comprised of group B. A second treatment of warm lateral condensation was then applied to these same canals which comprised of group C. The acrylic blocks were weighed after initial canal preparation and after each subsequent obturation. A 14.63% increase in weight of the gutta-percha occurred in group B compared with group A, and a 2.43% increase in weight occurred in group C compared with group B and both differences were statistically significant.

Similarly, Abedi H et al⁸ compared the weight of root canal filling material used in a new lateral condensation technique named mechanical lateral condensation (MLC) with that of conventional lateral condensation technique (LC). The mean weight for MLC obturations was 10.82 ± 0.025 g compared with 7.37 ± 0.035 g for that of LC technique. The difference was statistically significant ($P = 0.001$) and this study found that MLC technique requires more gutta-percha mass than LC technique.

Souza EM et al⁹ determined the influence of filling technique and root canal area on the percentage of gutta-percha in laterally compacted root fillings. A variation of cold lateral compaction using a sequence of spreaders prior to accessory cone placement was compared to two commonly-used techniques. Twenty additional canines with prepared root canals were used as negative controls in which gutta-percha was introduced into the canals but no compaction applied. The roots were sectioned horizontally at 3 and 6 mm from the apex.

Variations in root canal filling technique and canal area influenced the percentage of gutta-percha of laterally compacted root fillings. The percentage of gutta-percha was lower at the 3 mm level compared to the 6 mm level.

Gound TG et al¹⁰ compared the weight of gutta-percha used in obturation between the LC and the MLC techniques in resin blocks. The MLC technique obturations were significantly heavier on average than those of the LC fills. Gound TG et al¹¹ conducted an another study in which a simulated curved root canal in a resin block was enlarged to size 40 and used to compare the depth of accessory cone penetration and weight of obturation occurring with the use of different obturation techniques and spreader-accessory cone combinations. Twelve groups, each consisting of 10 obturations, were created. A conventional lateral condensation technique was used in six groups and a mechanical lateral condensation (MLC) technique was used in six matched groups. The six spreader-accessory cone combinations were either Fine-Medium or Fine nickel-titanium finger spreaders with either Fine, Medium-Fine, or size 25 accessory cones. MLC fills were significantly heavier and had greater depth of penetration on average than conventional lateral condensation. The best combination for heavy fills was MLC, Fine-Medium spreaders, and Fine accessory cones. The greatest mean accessory cone depth occurred with MLC, Fine-Medium spreaders, and size 25 accessory cones. The MLC technique fills were significantly heavier and had greater depth of penetration on average than those of the conventional lateral condensation. The best combination for heavy fills was the MLC, fine-medium spreaders, and fine accessory cones. The greatest mean accessory cone depth occurred with the MLC, fine-medium spreaders, and size 25 accessory cones.

CONCLUSION

Within the limitations of the study we conclude that Mechanical lateral condensation technique is superior to conventional lateral condensation technique in obturating endodontic canals.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Peters DD. Two-year in vitro solubility evaluation of four Gutta-Percha sealer obturation techniques. *J Endod.* 1986;12(4):139-45.
2. Kontakiotis EG, Wu MK, Wesselink PR. Effect of sealer thickness on long-term sealing ability: a 2-year follow-up study. *Int Endod J.* 1997;30(5):307-12.
3. Wu MK, Ozok AR, Wesselink PR. Sealer distribution in root canals obturated by three techniques. *Int Endod J.* 2000;33(4):340-5.
4. Seltzer S, Bender IB, Ziontz M. The interrelationship of pulp and periodontal disease. *Oral Surg Oral Med Oral Pathol.* 1963;16:1474-1490.
5. Seltzer S, Bender IB, Smith J, Freedman I, Nazimov H. Endodontic failures-an analysis based on clinical, roentgenographic, and histologic findings. *Oral Surg Oral Med Oral Pathol.* 1967;23:500-516
6. Weine FS. The enigma of the lateral canal. *Dent Clin North Am.* 1984;28:833-852.
7. Liewehr FR, Kulild JC, Primack PD. Improved density of gutta-percha after warm lateral condensation. *J Endod.* 1993;19(10):489-91.
8. Abedi H, Shahriari S, Jalalzadeh SM, Moradkhany R. A comparative study of density of obturated root canals by conventional and mechanical lateral condensation techniques. *Dent Res J (Isfahan).* 2009;6(2):55-8.
9. Souza EM, Wu MK, Van der Sluis LW, Leonardo RT, Bonetti-Filho I, Wesselink PR. Effect of filling technique and root canal area on the percentage of gutta-percha in laterally compacted root fillings. *International endodontic journal.* 2009 Aug;42(8):719-26.
10. Gound TG, Riehm RJ, Makkawy HA, Odgaard EC. A description of an alternative method of lateral condensation and a comparison of the ability to obturate canals using mechanical or traditional lateral condensation. *J Endod.* 2000;26(12):756-9.
11. Gound TG, Riehm RJ, Odgaard EC, Makkawy H. Effect of spreader and accessory cone size on density of obturation using conventional or mechanical lateral condensation. *J Endod.* 2001;27(5):358-61.