

Original Research

Comparison of density of gutta percha used as obturation material in different obturation techniques

Uzma Mushtaq¹, Farheen Mushtaq²

^{1,2}MDS conservative dentistry and endodontics, Private Consultant.

ABSTRACT:

Background: Successful endodontic treatment depends upon the quality of root canal preparation, three dimensional obturation and the coronal restoration. It is generally accepted that root fillings should contain more gutta-percha and less sealer. This may be more important when filling root canals with resorptive lacunae. **Aim of the study:** To compare density of gutta percha used as obturation material in different obturation techniques. **Materials and methods:** The study was conducted in the Department of Conservative Dentistry and Endodontics of dental institution. For the study, we selected 60 extracted maxillary central incisors with single canal and completed apex. Teeth with morphological and developmental anomalies were excluded from the study. Now, the prepared teeth were randomly grouped into 2 groups with 30 teeth in each group, Group LC and Group MLC. In group LC, the obturation was performed using conventional lateral condensation technique (LC) employing finger spreaders and in group MLC, the obturation was done using mechanical lateral condensation technique (MLC) employing a reciprocating handpiece for the same. **Results:** Teeth were randomly grouped into two groups with 30 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. The mean weight of gutta percha for Group LC was 9.09 ± 0.82 g and Group MLC was 12.48 ± 0.36 g. **Conclusion:** Within the limitations of the present study, it can be concluded that the density of gutta percha was comparatively more in teeth obturated with mechanical lateral condensation technique as compared to conventional lateral condensation technique of obturation.

Keywords: Root canal treatment, obturation technique, gutta percha

Received: 23/07/2020

Modified: 24/08/2020

Accepted: 25/08/2020

Corresponding author: Dr. Farheen Mushtaq, MDS conservative dentistry and endodontics, Private Consultant

This article may be cited as: Mushtaq U, Mushtaq F. Comparison of density of gutta percha used as obturation material in different obturation techniques. J Adv Med Dent Sci Res 2020;8(9):257- 260.

INTRODUCTION:

Successful endodontic treatment depends upon the quality of root canal preparation, three dimensional obturation and the coronal restoration. Ingle found that among the endodontic failures, 60% were due to incomplete obturation of the root canal system.¹⁻³ So it is indispensable that the root canal filling should be three dimensional and result in fluid tight seal, particularly in the last few millimeters of the apical area.⁴ Cold lateral compaction is the most widely used and considered to be the gold standard technique after being successfully tested. It is generally accepted that root fillings should contain more gutta-percha and less sealer. This may be more important when filling root canals with resorptive lacunae. In resorptive lacunae, it

is difficult to remove all bacteria and their products from the dentinal tubules. Dense compacted gutta-percha may block dentinal tubules, and this may lead to better entombment of microorganisms.^{5, 6} Hence, the present study was conducted to compare density of gutta percha used as obturation material in different obturation techniques.

MATERIALS AND METHODS:

The study was conducted in the Department of Conservative Dentistry and Endodontics of dental institution. The ethical approval for study was obtained from ethical committee of the institute before beginning the study. For the study, we selected 60 extracted 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 apex was prepared up to size 30 K file with step back preparation up to size 50 K-file. Amid the BMP, irrigation was done using 2 mL normal saline by 27 gauge needle. Between the BMP preparation, recapulation of the canals was done using size10 K-file to maintain the patency of the apical foramen. After the completion of instrumentation, 17% EDTA and 5.25% of sodium hypochlorite irrigates were used for removal of smear layer on dentin.

Now, the prepared teeth were randomly grouped into 2 groups with 30 teeth in each group, Group LC and Group MLC. In group LC, the obturation was performed using conventional lateral condensation technique (LC) employing finger spreaders and in group MLC, 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. Now, for both the groups, the

obturation was done using size 30 gutta percha master cone and size 15 gutta percha accessory cones. Sealers were not used in this study to avoid any errors in the study. After the completion of the obturation, at the orifice of the canal, extra gutta percha cones were cut-off. The weight of the obturated 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 statistically significant.

RESULTS:

Table 1 shows group demographics A total of 60 extracted maxillary central incisors were used in the study. Teeth were randomly grouped into two groups with 30 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. The mean weight of gutta percha for Group LC was 9.09 ± 0.82 g and Group MLC was 12.48 ± 0.36 g. The difference in weight of both the groups was statistically significant with a p value of 0.001.[Table 2 and Figure 1]

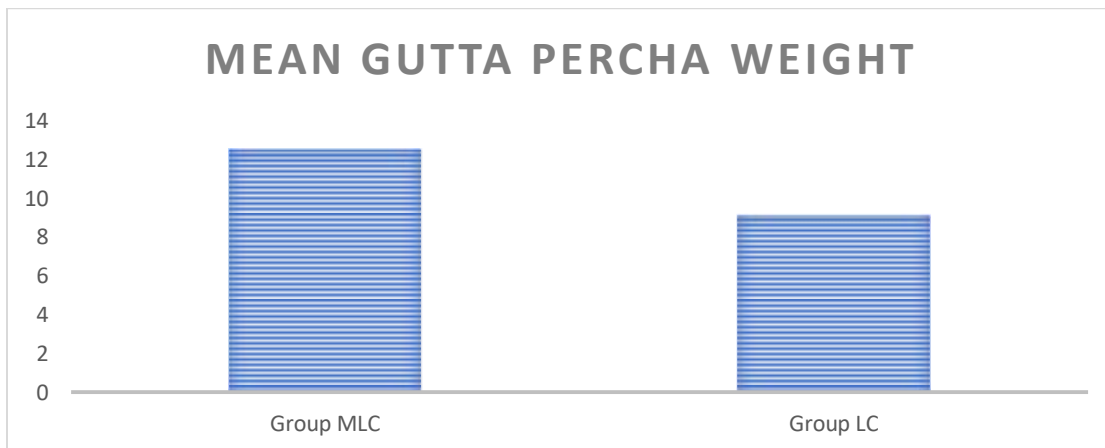
Table 1: Group demographics

Variables	Group LC	Group MLC
Number of teeth samples	30	30
Method used for gutta percha obturation	Conventional lateral condensation technique	Mechanical lateral condensation technique

Table 2: Comparison of mean gutta percha weight

Obturation Technique	Mean Gutta Percha weight	p-value
Group MLC	12.48 ± 0.36 g	0.28
Group LC	9.09 ± 0.82 g	

Fig 2:



DISCUSSION:

In the present study, we studied 60 maxillary central incisors. To check the density of gutta percha after obturation, we calculated weight change before and after the gutta percha obturation of root canals. On comparing the mean gutta percha weight in both the groups, it was observed that gutta percha weight was more in teeth who underwent obturation with mechanical lateral condensation technique. The results on comparison were observed to be statistically significant. The results on comparison were observed to be consistent with previous studies. Anantula K et al compared the sealing ability between the conventional cold lateral condensation technique and two different obturating techniques — Obtura II and GuttaFlow under a stereomicroscope at 40× magnification. The teeth were separated into three groups depending on the type of obturation technique. Group A (n = 20) — obturated using the Lateral condensation technique and AHplus 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 lowest mean of AV was recorded in the Obtura II group, 1.0%. This was statistically and significantly different from the GuttaFlow group, 3.0%. 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 GuttaFlow groups. The GuttaFlow group showed the maximum number of voids, 56%, which was significantly higher than those in the lateral condensation, 26% (95% CI= 19 – 34), and Obtura II, 15% groups. They concluded that the Obtura II technique utilizing the injection-molded thermoplasticized gutta-percha had better adaptability to the canal walls when compared to the GuttaFlow obturation and lateral condensation techniques.⁷ Patil P et al compared apical sealing ability between GuttaFlow and AH Plus. Eighty extracted human maxillary anterior teeth with fully formed apex and straight root were collected for this study. The root canals were cleaned and shaped using a standard step back preparation to size 60# master apical file at the established working length and divided into four groups: Group 1, GuttaFlow sealer with gutta-percha; Group 2, AH Plus sealer with gutta-percha; Group 3, positive control group; Group 4, negative control group. Dye leakage was carried out. The GuttaFlow group had a mean leakage of 1.38 mm whereas AH Plus had a mean of 1.425 mm. The standard deviation of GuttaFlow and AH Plus were 0.3861 and 0.3226, respectively. Student's unpaired t-test disclosed no significant difference between the groups. They

concluded that GuttaFlow and AH Plus showed no statistically significant difference in microleakage; the better result was shown by GuttaFlow.⁸

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. The overall mean volume fraction of gutta-percha was $68.51 \pm 6.75\%$ for CL, $86.56 \pm 5.00\%$ for UL, and $88.91 \pm 5.16\%$ for WV. Significant differences were found between CL and UL and between CL and WV, but not between UL and WV. 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. They concluded that WV compaction and UL compaction produced a significantly denser gutta-percha root filling than CL compaction.⁹ Monterde M et al compared root canal lateral condensation technique and other condensation techniques in which physical or chemical changes may affect the dimensional stability of obturation and thus favor apical microleakage. A total of 212 single-root teeth removed for orthodontic or periodontal reasons were randomized to 5 groups of 40 teeth each. The Soft-Core® obturated group showed significantly greater microleakage than the other groups, with no differences among the rest of the groups. They concluded that the teeth obturated with the Soft-Core® technique showed greater apical microleakage than the other systems.¹⁰

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. 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 while minimum difference was observed between groups I and II. Thus, all the between group differences were statistically significant. They concluded 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.¹¹

CONCLUSION:

Within the limitations of the present study, it can be concluded that the density of gutta percha was comparatively more in teeth obturated with mechanical lateral condensation technique as compared to conventional lateral condensation technique of obturation.

REFERENCES:

1. Kavitha A, Anil Kumar G. Evaluation and comparison of sealing ability of three different obturation techniques - Lateral condensation, Obtura II, and GuttaFlow: An in vitro study. *J Conserv Dent.* 2011;14(1):57–63.
2. Ingle JI, Bakland LK, Baumgartner JC. *Endodontics.* 5th ed. Connecticut: People's Medical Publishing House; 2008. pp. 571–75.
3. Dow RP, Ingle JI. Isotope determination of root canal failure. *Oral Surg Oral Med Oral Pathol Endod.* 1955;8:1100–04.
4. Robberecht L, Thomas C, Anne CC. Qualitative evaluation of two endodontic obturation techniques: tapered single-cone method versus warm vertical condensation and injection system-An in vitro study. *J Oral Sci.* 2012;54(1):99–104.
5. Rajeswari P, Gopi Krishna V, Kandaswamy D, et al. In vitro evaluation of apical micro leakage of Thermafil and Obtura heated gutta-percha in comparison with cold lateral condensation using fluid filtration system. *Endodontol.* 2006;8:24–32.
6. Gencoglu N, Yildirim T, Garip Y, Karagenc B, Yilmaz H. Effectiveness of different gutta-percha techniques when filling experimental internal resorptive cavities. *Int Endod J.* 2008;41:836–42.
7. Anantula K, Ganta AK. Evaluation and comparison of sealing ability of three different obturation techniques - Lateral condensation, Obtura II, and GuttaFlow: An in vitro study. *J Conserv Dent.* 2011;14(1):57-61. doi:10.4103/0972-0707.80748
8. Patil P, Rathore VP, Hotkar C, Savgave SS, Raghavendra K, Ingale P. A comparison of apical sealing ability between GuttaFlow and AH plus: An in vitro study. *J Int Soc Prev Community Dent.* 2016;6(4):377-382. doi:10.4103/2231-0762.186794
9. Ho ES, Chang JW, Cheung GS. Quality of root canal fillings using three gutta-percha obturation techniques. *Restor Dent Endod.* 2016;41(1):22-28. doi:10.5395/rde.2016.41.1.22
10. Monverde M, Pallarés A, Cabanillas C, Zarzosa I, Victoria A. A Comparative in Vitro Study of Apical Microleakage with Five Obturation Techniques: Lateral Condensation, Soft-Core®, Obtura II®, Guttaflow® and Resilon®. *Acta Stomatol Croat.* 2014;48(2):123-131.
11. Samadi F, Jaiswal J, Saha S, et al. A Comparative Evaluation of Efficacy of Different Obturation Techniques used in Root Canal Treatment of Anterior Teeth: An in vitro Study. *Int J Clin Pediatr Dent.* 2014;7(1):1-5. doi:10.5005/jp-journals-10005-1224