(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

DENSITY OF ENDODONTIC OBTURATIONS IN CONVENTIONAL AND MECHANICAL LATERAL CONDENSATION TECHNIQUES: A COMPARATIVE STUDY

Ashu Jhamb

Reader, Department of Conservative Dentistry and Endodontics, Bhojia Dental College and Hospital, Bhud Baddi, Himachal Pradesh, India

ABSTRACT:

Background: It is generally accepted that long-term endodontic success is dependent upon the ability to seal the peri-apical tissues from communication with the canal system. The present study was planned for comparison of conventional and mechanical lateral condensation techniques in the density of endodontic obturations. **Material and methods:** The study was conducted in the department of Conservative dentistry and Endodontics of dental institution. For the study, we selected 20 extracted human premolar teeth with single canal and completed apex. 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. **Results:** The mean weight of gutta percha for Group LC was 7.63 + 0.002 g and Group MLC was 11.02 + 0.006 g. **Conclusion:** MLC technique is superior to conventional lateral condensation technique in obturation of endodontic canals.

Keywords: Endodontic, gutta percha, lateral condensation, root canal

Corresponding author: Dr. Ashu Jhamb, Reader, Department of Conservative Dentistry and Endodontics, Bhojia Dental College and Hospital, Bhud Baddi, Himachal Pradesh, India

This article may be cited as: Jhamb A. Density of endodontic obturations in conventional and mechanical lateral condensation techniques: A comparative study. J Adv Med Dent Scie Res 2017;5(5):59-62.

Access this article online	
Quick Response Code	Website: www.jamdsr.com
	DOI: 10.21276/jamdsr.2017.5.5.16

INTRODUCTION:

Many recent endodontic obturation studies have dealt with the initial ability of various techniques to seal the canal system. It is generally accepted that long-term endodontic success is dependent upon the ability to seal the peri-apical tissues from communication with the canal system.[1] It is generally agreed in endodontics that complete obturation of the root canal system is achieved when a central core of gutta-percha is utilized with root canal cement which fills the intricacies of the canal system. Numerous techniques have been developed to achieve this objective with lateral condensation of gutta-percha being the most common technique taught.[2, 3] To accomplish this task, the amount of gutta-percha packed into the canal must be maximized. Lateral condensation is the obturation technique most widely taught in dental schools and used by practitioners, and is still the standard to which all other techniques are compared.[4] However, the technique can result in the creation of voids, spreader tracts, excessive amounts of sealer, and lack of surface adaptation to canal walls.[5-7] One of these methods, mechanical lateral condensation, involves placing a master cone in the canal, followed by a nickel-titanium spreader activated by a reciprocating-action handpiece.[6] Hence, the present study was planned for comparison of conventional and mechanical lateral condensation techniques in the density of endodontic obturations.

MATERIAL 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 20 extracted human premolar teeth 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 gauze 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 10 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. The Chi-square test and Student's t-test were employed to verify the statistical significance of the data. A p-value<0.05 was predefined to be statistical significant.

RESULTS:

A total of 20 extracted premolars were used in the study. Teeth were randomly grouped into two groups with 10 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 [Table 1 & 2]. The mean weight of gutta percha for Group LC was 7.63 $\pm$ 0.002 g and Group MLC was 11.02 $\pm$ 0.006 g. The difference in weight of both the groups was statistically significant with a p value of 0.001.[Table 3 and Figure 1]

Table 1: Gutta percha weight of all teeth obturated using mechanical lateral condensation technique

MECHANICAL LATERAL CONDENSATION TECHNIQUE	
Tooth no.	**Gutta percha weight, g (weight after obturation- weight before obturation)**
1	12.8 g
2	11.2 g
3	11.5g
4	9.8 g
5	8.9 g
6	11.6 g
7	12.2 g
8	11.4 g
9	10.2 g
10	10.6 g
MEAN WEIGHT	**11.02**

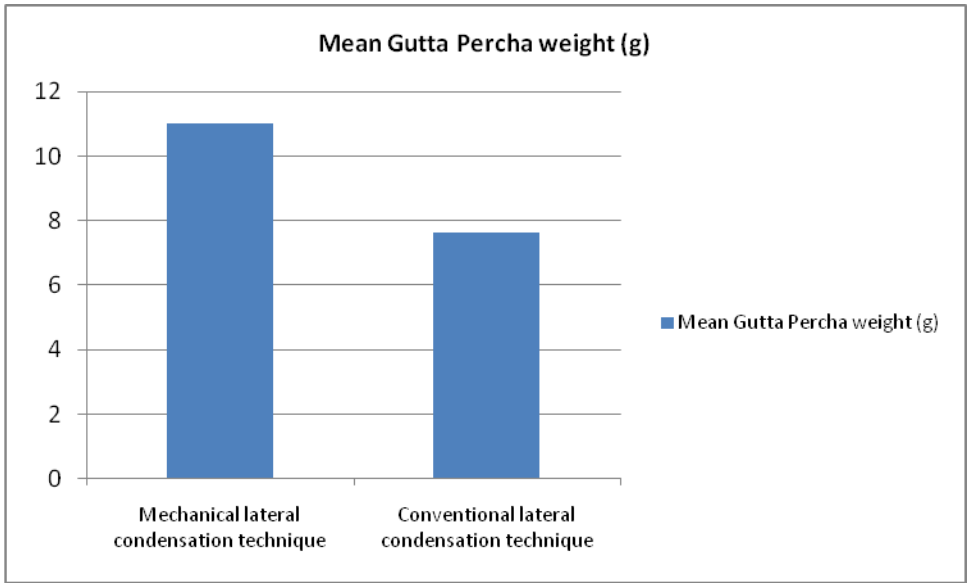
Table 2: Gutta percha weight of all teeth obturated using conventional lateral condensation technique

CONVENTIONAL LATERAL CONDENSATION TECHNIQUE	
Tooth no.	**Gutta percha weight, g (weight after obturation- weight before obturation)**
1	7.8 g
2	8.1 g
3	7.3 g
4	8.9 g
5	6.3 g
6	7.4 g
7	7.9 g
8	8.0 g
9	7.6 g
10	7.0 g
MEAN WEIGHT	**7.63**

Table 3: Comparative analysis of Mean gutta percha weight between both techniques

Obturation Technique	Mean Gutta Percha weight	p-value
Mechanical lateral condensation technique	**11.02**	**0.001**
Conventional lateral condensation technique	**7.63**	

Figure 1: Comparison of mean gutta percha weight between both techniques



DISCUSSION:

In past investigations, one strategy for assessing the nature of root canal obturation has been the visual review of the obturation material, either with the guide of a magnifying instrument or by radiographs. Due to the subjective way of these examinations, a more goal quantitative strategy was intended to look at changed obturation strategies. A similar study was conducted by Liewehr FR et al in which simulated straight root canals in 30 transparent acrylic blocks were instrumented and obturated with gutta-percha without sealer using standard lateral condensation (group A). The "zap and tap" method of warm lateral condensation was then used on the same 30 canals (group B). A second treatment of warm lateral condensation was then applied to these same canals (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.[8]

In the present study,a few changes were made to refresh the method and to mimic a more sensible clinical circumstance. We observed that mean weight of Gutta percha was significantly higher in Group MLC as compared to Group LC. Jarrett IS et al compared the apical density of several obturation techniques when used in palatal roots of extracted maxillary molars. Seventy extracted molars were randomly divided into seven groups with 10 teeth each. The palatal root canals were instrumented to size 60 MAF, coated with Kerr's Pulp Canal Sealer, and obturated using one of seven techniques. The cross-sections were photographed through a microscope, the photos were analysed, and the amount of area in the canal that was obturated with gutta-percha was measured. Simplifill used in accordance with the manufacturer's directions and Thermafil had the greatest mean obturated area, but neither were statistically better than mechanical lateral or warm vertical compaction (WVC; Schilder Technique). In addition, mechanical lateral and WVC (Schilder) had statistically more obturated area than WVC (continuous wave) and modified Simplifill.Reader CM et al evaluated the obturation of lateral canals and the main canal using three gutta-percha sealer techniques: cold lateral condensation, warm lateral condensation, and warm vertical condensation. Sixty epoxied blocks with five lateral canals placed at varying angles from the main canal were used. Each experimental group was treated by a board-certified endodontist with training and clinical experience in that obturation technique. There was no statistically significant differencebetween the obturation techniques in the ratio of the void area to the gutta-percha-plus-sealer area for the

main canal. There was significantly more sealer in the lateral canals for the two lateral condensation techniques. The warm obturation techniques had significantly more gutta-percha in the lateral canals.[9, 10]Peters DD evaluated in vitro solubility of the gutta-percha and sealer present in 236 tooth sections obturated by four different techniques after 2 yr. In only two of the techniques (lateral and vertical) was the sealer loss significant. However, only with the lateral technique could sealer loss be demonstrated in a significant apico-occlusal manner. Lateral was statistically different from the other techniques at a $p < 0.005$ level. Minimal changes were demonstrated by the chloroform dip and thermomechanical techniques.[11] Villegas JC et al evaluated the quality and adaptability of gutta-percha root canal fillings to the root canal walls when two different tapered gutta-percha master points (GPMP) were used to fill a split-tooth model. A maxillary central incisor was prepared for the split-tooth model and 10 fillings for group A (ISO .02 GPMP) and group B (ISO .10 GPMP) were carried out. The System B and the Obtura II were used to fill the split-tooth model and replication of round artificial depressions, voids within the gutta-percha (GP) and spaces between the GP and the root canal walls were evaluated and scored. Individual scores of each parameter evaluated were compared between the two groups and statistically analyzed using the Mann-Whitney U test. Group A showed statistically significant better scores for the replication of the artificial round depressions and spaces between the GP and the root canal walls. No statistically significant differences were found between the two groups for internal voids. It is concluded that the location of the GPMP binding point and the greater mass of the .10-Tapered GPMP may affect the quality and adaptation of the root canal filling in the important apical part of the canal.[12]

CONCLUSION:

In the present study we observed that the weight of MLC obturations were significantly higher as compared LC obturations and thus, this can be concluded that MLC technique is superior to conventional lateral condensation technique in obturation of endodontic canals.

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. IntEndod J. 1997;30(5):307–12.
3. Spradting PM, Senia ES. The relative sealing ability of paste-type fining materials. J Endodon 1982;8:543-9.
4. Benner MD, Peters DD, Grower M, Bernier WE. Evaluation of a new thermoplastic gutta-percha obturation technique using ~Ca. J Endodon1981 ;7:500-8.
5. Peters DD. Two-year in vitro solubility evaluation of four gutta-percha sealer obturation techniques. J Endodon 1986;12:139-45.
6. Kersten HW. Evaluation of three thermoplasticized gutta-percha filling techniques using a leakage model in vitro. IntEndod J 1988;21:353-60.
7. Genyuan X, Zhongni Z. Filling of the lateral canal. Oral Surg 1984;58:221-4.
8. Liewehr FR, Kulild JC, Primack PD. Improved density of gutta-percha after warm lateral condensation. J Endod. 1993;19(10):489–91.
9. Jarrett IS, Marx D, Covey D, Karmazin M, Lavin M, Gound T. Percentage of canals filled in apical cross sections - an in vitro study of seven obturation techniques. IntEndod J. 2004 Jun;37(6):392-8.
10. Reader CM, Himel VT, Germain LP, Hoen MM. Effect of three obturation techniques on the filling of lateral canals and the main canal. J Endod. 1993 Aug;19(8):404-8.
11. Peters DD. Two-year in vitro solubility evaluation of four Gutta-percha sealer obturation techniques. J Endod. 1986 Apr;12(4):139-45.
12. Villegas JC, Yoshioka T, Kobayashi C, Suda H. Quality of gutta-percha root canal fillings using differently tapered gutta-percha master points. J Endod. 2005 Feb;31(2):111-3.

Source of support: Nil **Conflict of interest:** None declared