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Original Research

Assessment of efficacy of different root canal obturation techniques in patients undergoing root canal therapy- A comparative study

Amola Tandon[1], Munish Goel[2], Jaskirat Singh[3]

[1]MDS (Conservative dentistry and Endodontist), Consultant Endodontist, Ludhiana (Punjab);
[2]MDS, Professor & Head, Department of Conservative Dentistry and Endodontics, Himachal Dental College, Sundernagar, Mandi, Himachal Pradesh;
[3]MDS (Orthodontist), Broomall (PA)

***ABSTRACT*:**
Background: Different techniques have been proposed over the years. The present study was conducted to compare different obturating techniques. **Materials & Methods:** The present study was conducted on 60 mandibular periodontally weak molar teeth. Teeth were divided into 3 groups of 20 teeth each. In all groups, Grossman sealer was used as the root canal sealer. In group I teeth, continuous wave of condensation technique was used, in group II teeth, thermomechanical compaction technique was used and in group III teeth, lateral condensation technique was used. **Results:** There were 20 filled canals in group I, 18 in group II and 15 in group III. The difference was significant (P< 0.05). Group II had the largest linear measure percentage of simulated lateral canals filled with gutta-percha and sealer (P< 0.05). No statistical differences were found between Group I and Group II when we analyzed the filling with gutta-percha and sealer or just sealer (P>0.05). No statistical differences were found between Group I and Group II when we analyzed the filling with just sealer. **Conclusion:** It was found that thermoplasticized gutta-percha filling techniques were better for filling lateral canal with gutta-percha and sealer or with just sealer than lateral condensation.
Key words: Thermoplasticized gutta-percha, Lateral condensation, Obturating

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Corresponding author: Dr. Amola Tandon, MDS (Conservative dentistry and Endodontist), Consultant Endodontist, Ludhiana (Punjab); India

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INTRODUCTION

For the adequate success of root canal therapy, it is necessary to complete remove the irritants, pathogenic micro-organisms and other by-products from the root canal space followed by complete shaping and filling of pulp space with a bio-compatible material with appropriate obturating technique.[1]Complete obliterating of root canal space with a bio-compatible, non-toxic 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.[2]

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. 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. Considering the high number of in vitro techniques proposed over the years, a model with a main and various lateral canals would be an important tool with which to investigate and compare filling techniques.[3]

In order to perform an adequate sealing of the root canal with lateral condensation technique is necessary to use adequate instruments.The introduction of thermoplastic gutta-percha to dentistry in the mid-19th century was a

turning point in endodontic treatment. Plasticity combined with physical durability made it possible for the material to move into the recesses of the root canal system and to adapt to the canal walls.[4]Over the past 150 years, the only real challenge to gutta-percha has been silver points, but these have now been largely abandoned. Soft-Core technique is a thermoplasticized obturation technique, which involved the use of a metal carrier coated with a layer of gutta-percha that was heated to permit thermoplasticized canal obturation. Soft-Core offers advantages, such as a reduction in chair side time and rapid setting of the gutta-percha.[5]The present study was conducted to compare different obturating techniques.

MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of 60 mandibular periodontally weak molar teeth. The study protocol was approved from institutional ethical committee.

In all teeth, biomechanical preparation was performed following standardized operative procedure. Teeth were divided into 3 groups of 20 teeth each. In all groups, Grossman sealer was used as the root canal sealer. In group I teeth, continuous wave of condensation technique was used, in group II teeth, thermomechanical compaction technique was used and in group III teeth, lateral condensation technique was used. The teeth were cross-sectioned, making the cut through points over the lateral canals; thus, 90 specimens were obtained. Each specimen was immersed in a polyester resin, and the blocks were polished. Images were obtained using a stereoscopic lens (40X). IOPAR were taken at buccal and mesial aspects to assess the quality of root canal filling that should be dense without voids and extended within 1 mm from the root end. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of teeth

Groups	Group I	Group II	Group III
Technique	Continuous wave of condensation	Thermomechanical compaction	Lateral condensation
Number	20	20	20

Table I shows that in group I teeth, continuous wave of condensation technique was used, in group II teeth, thermomechanical compaction technique was used and in group III teeth, lateral condensation technique was used.

Table II Number of lateral canals filled in all groups

Groups	Group I	Group II	Group III	P value
Filled	20	18	15	0.05

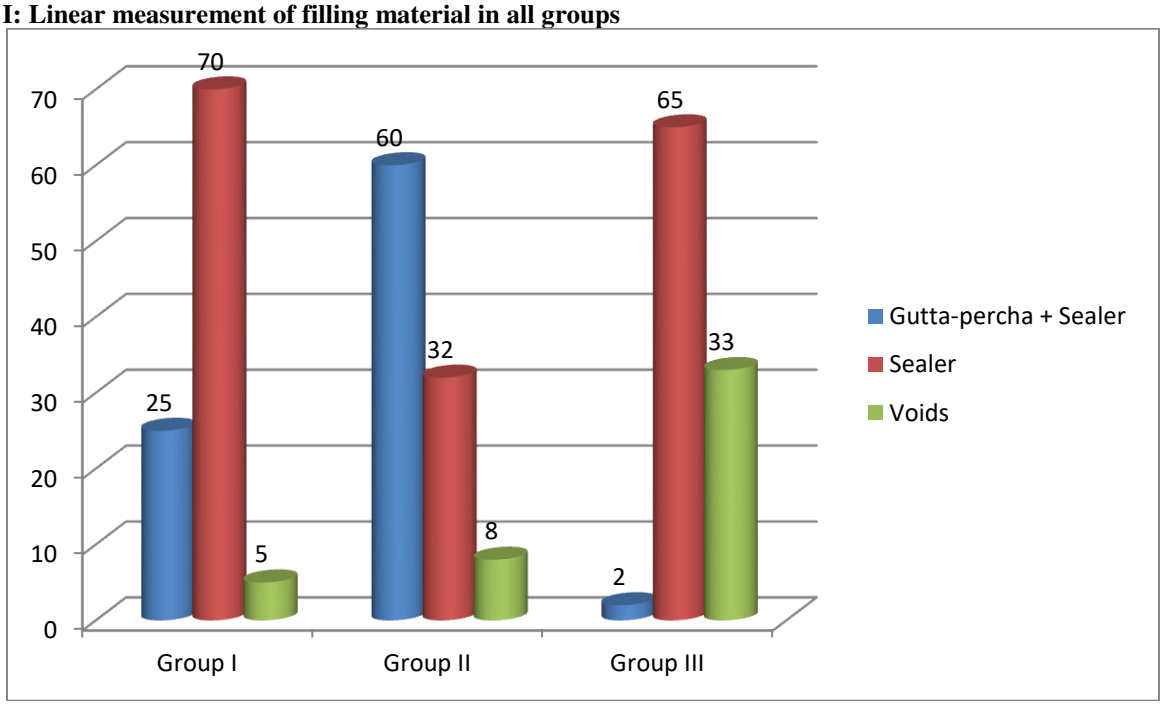
Table II shows that there were 20 filled canals in group I, 18 in group II and 15 in group III. The difference was significant ($P< 0.05$).

Table III Percentage of linear measurement of filling material in all groups

Group	Gutta-percha + Sealer	Sealer	Voids
Group I	25	70	5
Group II	60	32	8
Group III	2	65	33

Table III, graph I shows that group II had the largest linear measure percentage of simulated lateral canals filled with gutta-percha and sealer ($P< 0.05$). No statistical differences were found between group I and group II when we analyzed the filling with gutta-percha and sealer or just sealer ($P>0.05$). No statistical differences were found between group I and group II when we analyzed the filling with just sealer.

Graph I: Linear measurement of filling material in all groups



DISCUSSION

Gutta Flow is cold fluid obturation system that combines sealer and gutta-percha. GuttaFlow includes particulate gutta-percha in a polydimethyl siloxane base, which has good adaptability because of the increased flowability and better seal. Gutta Flow has got good fluidity for providing a thin film of sealer. Its antibacterial, insolubility, biocompatibility, and postsetting expansion properties, as claimed by the manufacturer, are promising as an obturating material.[6]

Cold lateral compaction has been used frequently based on comparison of new root canal filling techniques and materials. In the cold lateral condensation technique, spaces between the gutta-percha cones can result due to inadequate condensation pressure or a mismatch between the tapers of the spreader, gutta-percha cone, and the canal. Therefore, many materials and techniques have been developed with an objective to offer a higher sealing ability.[7]The present study was conducted to compare different obturating techniques.

In group I teeth, continuous wave of condensation technique was used, in group II teeth, thermomechanical compaction technique was used and in group III teeth, lateral condensation technique was used.Goldberg et al[8] in their study found that the lowest mean of AV was obtained by Gutta flow 1.25% ± 1.93, followed by gutta-percha 1.33% ± 2.16, and soft- core 1.74% ± 2.23. Statistical analysis showed no significant difference among the three groups and the levels of the root. The frequency of voids in the coronal and the middle levels was more than the apical for all groups. The highest frequency of voids was detected in soft-core, followed by gutta flow and gutta-percha respectively. The voids were located in the inter- phase between sealer and obturation material as well as sealer and root canal walls in the gutta-percha and soft-core groups, whereas it was almost confined to the core for Gutta flow group.

We found that there were 20 filled canals in group I, 18 in group II and 15 in group III. The difference was significant (P< 0.05). Group II had the largest linear measure percentage of simulated lateral canals filled with gutta-percha and sealer (P< 0.05). No statistical differences were found between group I and group II when we analyzed the filling with gutta-percha and sealer or just sealer (P>0.05). No statistical differences were found between Group I and Group II when we analyzed the filling with just sealer.

Several studies have reported endodontic success after filling of lateral canals and different filling techniques were proposed to achieve better obturation of these canals. Although some studies cast doubt on the idea that the type of canal filling technique has a great effect on the number of lateral canals filled, other studies have demonstrated that vertical compaction of warm gutta-percha increases the capacity of lateral canal filling.[9]Guigand et al[10] in their study used dye penetration technique, softcore resulted in the highest mean number of voids compared with cold lateral condensation and hybrid gutta-percha condensation technique. They have also reported that the mean apical leakage for the softcore technique was at least twice as extensive as for the two other gutta-percha obturation techniques.

CONCLUSION

It was found that thermoplasticized gutta-percha filling techniques were better for filling lateral canal with gutta-percha and sealer or with just sealer than lateral condensation.

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