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**ORIGINAL RESEARCH** 

# Percentage of voids in root canal obturation using different techniques of sealer placement

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## ABSTRACT

**Background:** An essential step in the effectiveness of root canal therapy is root canal obturation. Although gutta percha is the most widely utilized root canal filler material, its inability to stick to dentinal canal walls prevents it from completely sealing the root canal gap. The present study to compared the percentage of voids in root canal obturation using different techniques of sealer placement. **Materials & Methods:** 70 mandibular first premolars were divided into two groups of 35 each. The K file was employed in group I, while the Lentulo spiral sealer placement technique was used in group II. Sections were examined for void detection in the apical, middle, and coronal thirds using a digital microscope set to 150X magnification. **Results:** In group I, K file and in group II, Lentulo spiral sealer placement technique was used. Percentage of voids at coronal sections was3% and 2%, at middle third was 2% and 1% and at apical third was 1% and 0% in group I and II respectively. The difference was significant (P< 0.05). **Conclusion:** The K file method of sealer installation produced the highest percentage of voids.

Key words: Root canal, Gutta percha, voids

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#### INTRODUCTION

An essential step in the effectiveness of root canal therapy is root canal obturation. Although gutta percha is the most widely utilized root canal filler material, its inability to stick to dentinal canal walls prevents it from completely sealing the root canal gap. Therefore, the space between the gutta percha and canal walls is filled in with sealers. The root canal system's inadequate obturation accounts for about 60% of endodontic failures. It has been documented that inadequate obturation causes gaps in the canal filling and at the interface between the filling and dentin. These cavities allow bacteria to travel in the coronal-apical direction or vice versa, which may result in reinfection or chronic apical periodontitis.

The accumulation of hard and/or soft tissue debris, which can contain biofilms and intracanal bacteria, within the isthmuses following canal preparation makes them one of the most challenging clinical problems during root canal therapy. This might result in treatment failure. To obtain a high-quality seal in isthmus locations, the selection of root canal filling materials and obturation procedure is crucial. The majority of root canal filling methods use gutta-percha (GP) as the core material and a sealer to close the gap between GP and the canal wall. The present study to compared the percentage of voids in root canal obturation using different techniques of sealer placement.

### **MATERIALS & METHODS**

The present invitro study was conducted on 70 mandibular first premolars which were prepared using the step-back technique. Using the sealer placement procedure, the teeth were divided into two groups of 35 each. The K file was employed in group I, while the Lentulo spiral sealer placement technique was used in group II. Specimens were sliced horizontally into 3 mm slices following the application of sealer and canal obturation using the lateral condensation technique. Sections were examined for void detection in the apical, middle, and coronal thirds using a digital microscope set to 150X magnification. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

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# **RESULTS** Table I Distribution based on method employed

Groups	Group I	Group II
Method	K file	Lentulo spiral

Table I shows that in group I, K file and in group II, Lentulo spiral sealer placement technique was used.

## Table II Percentage of voids in different sections of teeth

Sections	Group I	Group II	P value
Coronal	3%	2%	0.62
Middle	2%	1%	0.05
Apical	1%	0%	0.05

Table II shows that percentage of voids at coronal sections was 3% and 2%, at middle third was 2% and 1% and at apical third was 1% and 0% in group I and II respectively. The difference was significant (P< 0.05).

Graph I Percentage of voids in different sections of teeth



## DISCUSSION

The majority of root canal filling methods use guttapercha (GP) as the core material and a sealer to close the gap between GP and the canal wall. The most traditional approach of clinical root canal obturation is the traditional technique of lateral condensation (LC), which has been employed in many research for a long time. In the meantime, it has been noted that thermoplastic sealing methods, like continuous wave of condensation (CWC), are beneficial for treating uneven root canals. Because it is simpler to use, more three-dimensional adaptable for preparation, inexpensive, and requires less time to operate when combined with a bioceramic sealer, the single cone (SC) technique has grown in popularity. The present study to compared the percentage of voids in root canal obturation using different techniques of sealer placement.

We observed that in group I, K file and in group II, Lentulo spiral sealer placement technique was used. Nabavizadeh et al used four distinct sealer placing strategies to compare the proportion of voids after root canal obturation with gutta percha and AH26 sealer. The step-back approach was used in this laboratory experiment to prepare the root canals of fifty mandibular second premolars. Based on the sealer implantation method, the teeth were divided into four experimental groups of ten and one control group. Sections were examined for void detection in the apical, middle, and coronal thirds using a digital microscope set to 150X magnification. There was no discernible difference between the four approaches in terms of the percentage of voids in one-thirds or total sections.

We found that percentage of voids at coronal sections was3% and 2%, at middle third was 2% and 1% and at apical third was 1% and 0% in group I and II respectively. By calculating the percentage of voids, Kim et al. assessed the root-filling quality of gutta percha (GP) cones and a calcium silicate-based sealer. Two sets of twenty artificial molar teeth were created: one group was obturated using the continuous wave (CW) approach, while the other group was obturated using the single-cone (SC) technique. Endoseal MTA

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and GP cones were used for obturation. Microcomputed tomography was used to scan obturated teeth, and the percentage of void volume in the coronal and apical regions was computed. The differences between the two methods were assessed using a linear mixed model (p < 0.05). Except for the CW group, which showed a substantially higher void volume in the coronal area of the distal canal (p <0.05), there was no significant difference in the percentage of voids between the filling materials and root canal walls between the two obturation techniques (p > 0.05). With the exception of the apical region of the distal canal (p > 0.05), the proportion of voids inside the filling material was substantially larger in the CW groups for all comparisons (p < p0.05). Between the two methods, there was no discernible difference in the voids in the apical region between the filling material and the canal wall.

Using three distinct filling methods, Zhang et al. evaluated the existence of voids in band-shaped isthmuses. Three groups (n=8) of twenty-four artificial molar teeth with a band-shaped isthmus were assigned to obturation based on the filling technique: lateral condensation (LC), continuous wave of condensation (CWC), or single-cone (SC). Guttapercha (GP) cones and iRoot SP (Innovative Bioceramix, Vancouver, Canada) were used for obturation. Micro-CT scanning was done after filling. In the isthmus regions, the percentage of void volumes and filling materials was computed. Following obturation, the mean percentage of void volumes and matching filling percentages in the is thmus areas were 22.98%  $\pm 1.19\%$ , 77.02%  $\pm 1.19\%$ in the SC groups,  $10.46\% \pm 2.28\%$ ,  $89.54\% \pm 2.28\%$ in the CWC groups, and  $13.14\% \pm 1.85\%$ ,  $86.86\% \pm$ 1.85% in the LC groups.

## CONCLUSION

Authors found that the K file method of sealer installation produced the highest percentage of voids.

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