

Original Research

Comparison of efficacy of two different root canal sealers for endodontic treatment

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ABSTRACT:

Background: This study was conducted to assess the comparison of efficacy of two different root canal sealers for endodontic treatment. **Material and methods:** This study comprised of 50 teeth that had been treated using 2 different root canal sealers. The teeth had been divided into 2 groups based on the sealers used. AH Plus root canal sealer was used in the teeth of Group 1 and MTA Fillapex root canal sealer was used in the teeth of Group 2. The efficacy of the two sealers was assessed. The findings were tabulated. Statistical analysis was conducted using SPSS software. **Results:** In this study, Group 1 comprised of 25 teeth treated with AH Plus root canal sealer and Group 2 comprised of 25 teeth treated with MTA Fillapex root canal sealer. The mean fracture force of the teeth of Group 1 was 256.34 N and the mean fracture force for the teeth of Group 2 was 194.27 N. **Conclusion:** Based on the results of this study, it can be concluded that the fracture resistance of AH Plus root canal sealer was higher as compared to MTA Fillapex root canal sealer.

Keywords: root canal treatment, sealer, efficacy

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INTRODUCTION

The integrity of endodontically treated teeth is significantly influenced by the quantity of remaining tooth structure following canal preparation. Several factors contribute to the risk of root fracture post-endodontic therapy, including excessive instrumentation, dehydration of dentin, and uncontrolled pressure during the obturation process. Collectively, these elements, along with occlusal forces, heighten the likelihood of root fractures. Additionally, the synergistic effects of intracanal irrigants and medicaments may alter the physical and mechanical characteristics of root dentin, potentially leading to the failure or fracture of treated teeth. In the context of endodontically treated teeth, the reinforcement of the root canal system is achieved through the obturation process, which aims to enhance the tooth's resistance to compressive forces.¹⁻³

A critical aspect of this process is the effective bonding of the root canal sealer to the dentin, which is essential for ensuring a hermetic seal within the root

canal filling. Consequently, a root canal sealer that possesses the ability to fortify the tooth against fractures would be highly beneficial. Various research approaches have led to the development of materials that promote adhesion to the root canal system, as it is believed that both adhesion and mechanical interlocking can enhance the remaining tooth structure, thereby mitigating the risk of fracture.⁴

The zinc oxide-eugenol (ZOE) sealer, specifically the Kerr sealer from Rickert, California, USA, has been the most widely utilized root canal sealer for several decades due to its favorable physicochemical properties. Nonetheless, issues such as leakage and recontamination of the root canal system can arise from the loss of eugenol or zinc oxide through ongoing hydrolysis, leading to complications following treatment.⁵

This study was conducted to assess the comparison of efficacy of two different root canal sealers for endodontic treatment.

MATERIAL AND METHODS

This study comprised of 50 teeth that had been treated using 2 different root canal sealers. The teeth had been divided into 2 groups based on the sealers used. AH Plus root canal sealer was used in the teeth of Group 1

and MTA Fillapex root canal sealer was used in the teeth of Group 2. The efficacy of the two sealers was assessed. The findings were tabulated. Statistical analysis was conducted using SPSS software.

RESULTS

Table 1: Group-wise distribution of teeth.

Groups	Number of teeth	Percentage
Group 1 (AH Plus root canal sealer)	25	50
Group 2 (MTA Fillapex root canal sealer)	25	50
Total	50	100

Group 1 comprised of 25 teeth treated with AH Plus root canal sealer and Group 2 comprised of 25 teeth treated with MTA Fillapex root canal sealer.

Table 2: Mean fracture force for two sealers

Groups	Mean fracture force
Group 1 (AH Plus root canal sealer)	256.34 N
Group 2 (MTA Fillapex root canal sealer)	194.27 N

The mean fracture force of the teeth of Group 1 was 256.34 N and the mean fracture force for the teeth of Group 2 was 194.27 N.

DISCUSSION

A root canal sealer is defined as a bond established between radicular dentine and the filling material. For effective root canal sealing, it is crucial that the sealer exhibits resistance to disruption of the seal through mechanisms such as micromechanical retention or friction, particularly during the flexure of the tooth in the oral environment or while preparing cores and postspaces in the coronal and middle thirds of the canal walls.^{6,7}

The primary function of the sealer is to eliminate irregularities, including grooves and lateral depressions, that cannot be adequately filled with Gutta-percha, thereby enhancing the marginal fit to the dentinal walls and facilitating the filling of lateral canals. Ultimately, the completed root filling must effectively prevent microleakage and bacterial infiltration. The adhesion of the root canal sealer to radicular dentine is critical for two primary reasons. Firstly, a superior seal minimizes both coronal and apical leakage, and secondly, it helps to prevent the displacement of the filling material during subsequent restorative procedures.⁸⁻¹⁰

The wide range of sealers have been used over the years, namely, ZOE, Ca(OH)₂ sealer, glass ionomer sealer, resin sealers (epoxy-based, urethane dimethacrylate-based) and most recently Bioceramic and MTA-based root canal sealers.¹¹⁻¹³

This study was conducted to assess the comparison of efficacy of two different root canal sealers for endodontic treatment.

In this study, Group 1 comprised of 25 teeth treated with AH Plus root canal sealer and Group 2 comprised of 25 teeth treated with MTA Fillapex root canal sealer. The mean fracture force of the teeth of Group 1 was 256.34 N and the mean fracture force for the teeth of Group 2 was 194.27 N.

Phukan AH et al¹⁴ compared the *in vitro* effects of four different root canal sealers on the fracture resistance of endodontically treated teeth. Seventy-five freshly extracted human mandibular premolars were used for the study. Teeth were divided into five groups based on type of root canal sealers used. Gutta-percha was used for all the samples: Group I: AH Plus root canal sealer, Group II: MTA Fillapex root canal sealer, Group III: Apexit root canal sealer, Group IV: Conventional zinc oxide-eugenol (ZOE) sealer, Group V: Control (unobturated teeth). The teeth were embedded in acrylic resin blocks and fracture force was measured using a universal testing machine (Asian Test Equipments). Data obtained were statistically evaluated using one-way ANOVA and *post hoc* test (Tukey's test). All groups showed statistically significant result ($P < 0.05$). Group I and Group II showed higher resistance to fracture than other three groups. There was comparable difference in fracture force between Group I and Group II. Moreover, there was no statistically significant difference between Group III and Group IV and between Group IV and Group V. Based on this *in vitro* study, resin-based sealer was more effective as compared to other sealers and the control group. However, no significant differences were observed between ZOE and control group.

Simsek N et al.¹⁵The aim of this study was to evaluate the effectiveness of two retreatment techniques, in terms of the operating time and scanning electron microscopy (SEM) results, in removing three different root canal sealers from root canals that were previously filled with gutta-percha. Sixty extracted single-rooted human premolars were divided into three groups and filled with iRoot SP, MM Seal, and AH Plus sealers, along with gutta-percha, through a lateral compaction technique. Root canal fillings of the samples were removed by ESI ultrasonic tips or R-

Endo files. The time to reach the working length was recorded. Longitudinally sectioned samples were examined under SEM magnification. Each picture was evaluated in terms of the residual debris. Data were statistically analyzed with the Kruskal-Wallis test. No statistically significant differences were found in terms of operating time ($p>0.05$). Significant differences in the number of debris-free dentinal tubules were found among the root canal thirds, but this finding was not influenced by the experimental group ($p<0.05$). Resin sealer tags were observed inside the dentinal tubules in the MM Seal group. Under the conditions of this study, it may be established that there was no difference among the sealers and retreatment techniques.

CONCLUSION

Based on the results of this study, it can be concluded that the fracture resistance of AH Plus root canal sealer was higher as compared to MTA Fillapex root canal sealer.

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