

Original Research

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

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Abstract

Background: This study had been carried out to evaluate the comparison of efficacy of two different root canal sealers for endodontic treatment.

Material and methods: This research involved a sample of 50 teeth, which were treated with two distinct types of root canal sealers. The teeth were categorized into two groups according to the sealers applied. Group 1 utilized AH Plus root canal sealer, while Group 2 employed MTA Fillapex root canal sealer. The effectiveness of these two sealers was evaluated, and the results were systematically recorded. Statistical analysis was performed 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: The findings of this study indicate that the fracture resistance of the AH Plus root canal sealer surpasses that of the MTA Fillapex root canal sealer.

Keywords: root canal treatment, sealer, efficacy

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Introduction

The structural integrity of teeth that have undergone endodontic treatment is profoundly affected by the amount of remaining dental tissue after the preparation of the root canal. Various factors increase the likelihood of root fractures following endodontic procedures, such as over-instrumentation, the desiccation of dentin, and the application of excessive pressure during the filling process. These factors, in conjunction with occlusal forces, significantly elevate the risk of root fractures. Furthermore, the combined effects of intracanal irrigants and medicaments can modify the physical and mechanical properties of root dentin, which may result in the failure or fracture of the treated teeth. In the realm of endodontic therapy,

the obturation process serves to reinforce the root canal system, thereby improving the tooth's ability to withstand compressive forces.¹⁻³

An essential component of this procedure is the successful adhesion of the root canal sealer to the dentin, which is crucial for achieving a hermetic seal in the root canal filling. Therefore, a root canal sealer that can strengthen the tooth against fractures would be particularly advantageous. Different research methodologies have contributed to the creation of materials that enhance adhesion to the root canal system, as it is posited that both adhesion and mechanical interlocking can improve the integrity of the remaining tooth structure, thus reducing the likelihood of fracture.⁴

The zinc oxide-eugenol (ZOE) sealer, particularly the Kerr formulation from Rickert, California, USA, has been extensively employed as a root canal sealer for many years, attributed to its advantageous physicochemical characteristics. However, challenges such as leakage and recontamination of the root canal system may occur due to the depletion of eugenol or zinc oxide resulting from continuous hydrolysis, which can lead to complications post-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 research involved a sample of 50 teeth, which were treated with two distinct types of root canal sealers. The teeth were categorized into two groups according to the sealers applied. Group 1 utilized AH Plus root canal sealer, while Group 2 employed MTA Fillapex root canal sealer. The effectiveness of these two sealers was evaluated, and the results were systematically recorded. Statistical analysis was performed 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 consisted of 25 teeth that were treated using AH Plus root canal sealer, while Group 2 included 25 teeth that received treatment 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)	235.95 N
Group 2 (MTA Fillapex root canal sealer)	187.11 N

The mean fracture force of the teeth of Group 1 was 235.95 N and the mean fracture force for the teeth of Group 2 was 187.11 N.

Discussion

A root canal sealer is characterized as the adhesive connection formed between the radicular dentine and the filling material. To achieve optimal sealing in root canals, it is essential for the sealer to possess the ability to withstand the potential disruption of the seal. This resistance can be attributed to mechanisms such as micromechanical retention or friction, especially during the flexural movements of the tooth within the oral cavity or during the preparation of cores and posts in the coronal and middle thirds of the canal walls.^{6,7}

The main role of the sealer is to address surface irregularities, such as grooves and lateral depressions, which cannot be sufficiently filled with Gutta-percha. This process improves the marginal fit against the dentinal walls and aids in the filling of lateral canals. Ultimately, the finished root filling must successfully prevent microleakage and the ingress of bacteria. The bond between the root canal sealer and radicular dentine is essential for two key reasons. First, an effective seal reduces the risk of leakage at both the coronal and apical ends. Second, it plays a vital role in preventing the movement of the filling material during later restorative interventions.⁸⁻¹⁰

A diverse array of sealers has been employed throughout the years, including zinc oxide-eugenol (ZOE), calcium hydroxide (Ca(OH)₂) sealers, glass ionomer sealers, and resin-based sealers such as those derived from epoxy and urethane dimethacrylate. More recently, bioceramic and mineral trioxide aggregate (MTA)-based root canal sealers have gained prominence.¹¹⁻¹³

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

In this investigation, Group 1 consisted of 25 teeth that were sealed with AH Plus root canal sealer, while Group 2 included 25 teeth treated with MTA Fillapex root canal sealer. The average fracture force recorded for the teeth in Group 1 was 235.95 N, whereas the average fracture force for the teeth in Group 2 was 187.11 N.

Phukan AH et al.¹⁴ conducted a comparative study on the in vitro effects of four distinct root canal sealers on the fracture resistance of teeth that had undergone endodontic treatment. The research utilized seventy-five freshly extracted human mandibular premolars, which were categorized into five groups according to the type of root canal sealer applied. All samples were filled with gutta-percha, with the groups designated as follows: Group I received AH Plus root canal sealer, Group II was treated with MTA Fillapex root canal sealer, Group III utilized Apexit root canal sealer, Group IV was filled with conventional zinc oxide-

eugenol (ZOE) sealer, and Group V served as the control group with unobturated teeth. The teeth were embedded in acrylic resin blocks, and the fracture force was assessed using a universal testing machine (Asian Test Equipments). The data collected were analyzed statistically through one-way ANOVA and post hoc testing (Tukey's test). The results indicated statistically significant differences among all groups ($P < 0.05$). Notably, Groups I and II exhibited greater fracture resistance compared to the other three groups, with a comparable fracture force observed between them. Additionally, no significant differences were found between Group III and Group IV, nor between Group IV and Group V. This *in vitro* investigation suggests that resin-based sealers are more effective than the other sealers and the control group, although no significant differences were noted between the ZOE sealer and the 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

The findings of this study indicate that the fracture resistance of the AH Plus root canal sealer surpasses that of the MTA Fillapex root canal sealer.

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