

ORIGINAL RESEARCH

Comparison of efficacy of two different Root canal sealers used on the fracture resistance of endodontically treated teeth

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ABSTRACT:

Background: In endodontically treated teeth, the root canal system is reinforced by obturating the root canal in order to increase the resistance of the tooth to compressive strength. To provide a hermetic seal, the bonding of root canal sealer to the dentine is paramount in maintaining the integrity of the seal in a root canal filling. Hence; the present study was undertaken for assessing and comparing the efficacy of two different Root canal sealers used on the fracture resistance of endodontically treated teeth. **Materials & methods:** A total of 50 freshly extracted maxillary first premolars were included in the present study. All the specimens were divided into two study groups with 25 specimens in each group as follows: Group A: AH plus sealer was used, and Group B: MTA Fillapex sealer was used. After completion of biomechanical preparation, obturation was done according to the respective groups. After completion of root canal therapy, all the specimens were cut from apical one-third and were subjected to universal force testing machine for evaluating the fracture resistance. **Results:** Mean fracture resistance among specimens of group A and group B was found to be 253.4 N and 166.4 N respectively. In the present study, while doing statistical analysis, it was seen that mean fracture resistance among specimens of group A was significantly higher in comparison to specimens of group B. **Conclusion:** Fracture resistance of AH plus sealer is significantly higher in comparison to MTA Fillapex sealer.

Key words: Root canal sealers, Fracture resistance

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INTRODUCTION

Endodontic treatment aims to eliminate infection of the root canal and to completely fill the root canal space in three-dimension, in order to prevent apical and coronal penetration of liquids and microorganisms. Most root canals are filled with gutta-percha points in combination with an endodontic sealer which are essential components of root canal obturation to establish a fluid-tight seal. The main function of a sealer is to fill the spaces between the core material and the walls of root canal and between the gutta-percha cones, in an attempt to form a coherent mass of obturating material without voids.¹⁻³ In endodontically treated teeth, the root canal system is reinforced by obturating the root canal in order to increase the resistance of the tooth to compressive strength. To provide a hermetic seal, the bonding of root canal sealer to the dentine is paramount in maintaining the integrity of the seal in a root canal filling. Thus, a root canal sealer with the property of strengthening the tooth against root

fracture would be of obvious value.⁴⁻⁶ Hence; the present study was undertaken for assessing and comparing the efficacy of two different Root canal sealers used on the fracture resistance of endodontically treated teeth.

MATERIALS & METHODS

The present study was undertaken for assessing and comparing the efficacy of two different Root canal sealers used on the fracture resistance of endodontically treated teeth. A total of 50 freshly extracted maxillary first premolars were included in the present study. Carious tooth, grossly decayed tooth and tooth specimens with presence of developmental anomaly were excluded from the present study. All the specimens were sectioned at the level of cement-enamel junction. Biotechnical preparation was done in all the specimens using sodium hypochlorite root canal irrigant. All the specimens were divided into two study groups with 25 specimens in each group as follows:

- Group A: AH plus sealer was used, and
- Group B: MTA Fillapex sealer was used.

After completion of biomechanical preparation, obturation was done according to the respective groups. After completion of root canal therapy, all the specimens were cut from apical one-third and were subjected to universal force testing machine for evaluating the fracture resistance. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

RESULTS

In the present study, 50 freshly extracted maxillary first premolars were included in the present study. All the specimens were divided into two study groups with 25 specimens in each group as follows: Group A: AH plus sealer was used, and Group B: MTA Fillapex sealer was used. Mean fracture resistance among specimens of group A and group B was found to be 253.4 N and 166.4 N respectively. In the present study, while doing statistical analysis, it was seen that mean fracture resistance among specimens of group A was significantly higher in comparison to specimens of group B.

Table 1: Comparison of fracture resistance

Fracture resistance (N)	Group A	Group B
Mean	253.4	166.4
SD	45.2	33.1
p- value	0.00 (Significant)	

DISCUSSION

The long-term success of endodontic therapies relies on complete filling after root canal obturation. Microleakage is one of the significant causes for endodontic failure, which occurs due to poor contacts between the gutta-percha and the sealer, the sealer and the dentin, or through voids within the sealer. In general, the oral bacteria could contaminate the entire length of root canal within 30 days of obturation, while endotoxins from *Actinobacillus actinomycetemcomitans* could be observed in obturated root canals within 20 days. Due to the complexity of root canal systems, pulp tissue and inorganic debris remain in areas instruments and irrigation solutions cannot easily access after root canal treatments. Thus, microorganisms surviving in the root canal will subsequently grow and spread to the periradicular areas between the sealer and dentin. Permanent coronal restorations also provide seals equally as important as the apical seal after the root canals are filled. When insufficient coronal sealing occurs or the root canal remains open, oral bacteria will access the apical foramen.^{8- 10} Hence; the present study was undertaken for assessing and comparing the efficacy of two different Root canal sealers used on the fracture resistance of endodontically treated teeth.

In the present study, 50 freshly extracted maxillary first premolars were included in the present study. All the specimens were divided into two study groups with 25 specimens in each group as follows: Group A: AH plus sealer was used, and Group B: MTA Fillapex sealer was

used. Mean fracture resistance among specimens of group A and group B was found to be 253.4 N and 166.4 N respectively. Kaur A et al determined the relative toxicity of commonly used root canal sealers like zinc oxide eugenol, calcium hydroxide, and resin-based sealers. An online search was conducted in peer-reviewed journals listed in PubMed, Cochrane, EBSCO, and IndMed databases between 2000 and 2012). Statistical analysis was carried out by using analysis of variance (ANOVA) followed by post-hoc comparison by Bonferroni method. At 24 h, the relative biotoxicity of the three sealers reported was insignificant (P- value 0.29), but the difference in toxicity was found significant (P < 0.001) after 3 days. Calcium hydroxide sealer and zinc oxide eugenol were found to be significantly biotoxic as compared to resin-based sealers after 3 days.¹¹

In the present study, while doing statistical analysis, it was seen that mean fracture resistance among specimens of group A was significantly higher in comparison to specimens of group B. Monajemzadeh A et al investigated the antimicrobial activity of three root canal sealers against oral pathogens. The antimicrobial effectiveness of three endodontic sealers with different chemical compositions, namely resin (AH 26), zinc oxide eugenol (ZOE), and mineral trioxide aggregate (MTA), against *Candida albicans*, *Streptococcus sanguis*, *Streptococcus salivarius*, *Streptococcus mutans*, and *Lactobacillus casei* was assayed by agar well diffusion method (AWDM). The tested sealers were prepared according to the manufacturer's instructions and poured in the prepared wells of agar plates; diluted inocula (105 and 106 CFU/ml) of the tested microorganism strains were also used. The minimum inhibitory concentration (MIC) values of the selected canal sealers ranged between 3.12 and 50 mg.ml-1 against the employed microorganism strains. All the plates were incubated at 37°C under anaerobic condition for bacteria and at 30°C for *C. albicans*. After three days, the inhibition zones were measured. AH 26 exhibited strong activity against *C. albicans* with the minimum inhibitory concentration of 12.5 mg.ml-1, but ZOE and MTA did not act against *C. albicans*. ZOE sealer had the highest antimicrobial activity against the tested bacteria, while MTA showed the lowest antimicrobial activity. The ascending sequence of microbial growth inhibition zones was as follows AH 26 > ZOE > MTA.¹²

CONCLUSION

From the above results, the authors concluded that fracture resistance of AH plus sealer is significantly higher in comparison to MTA Fillapex sealer.

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