

Original Research

Evaluation of efficacy of two root canal sealers for root canal therapy

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ABSTRACT:

Background: To evaluate the efficacy of two root canal sealers for root canal therapy. **Materials & methods:** A total of 20 molars were enrolled. The age group included was 25- 45 years. Teeth were divided into two groups of 10 teeth each based on the type of root canal sealers used. All the molars were evaluated clinically and radiographically at regular intervals. **Results:** A total of 20 teeth were enrolled. The mean dye leakage was evaluated. In group I, mean dye leakage was 34.6 and in group II, the mean dye leakage was 7.9. **Conclusion:** Resin cement sealed the root canals significantly better when compared with zinc oxide eugenol.

Keywords: root canal therapy, root canal sealer, zinc oxide eugenol.

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INTRODUCTION

Root canal treatment is an effective, less invasive and ideal treatment modality for pulpally involved tooth and salvaging it from extraction. Cleaning, shaping and three dimensional obturation of root canal system are essential steps in root canal treatment. ¹ The bacteria impervious seal that is essential for success is provided by the root canal sealer and obturation material. ² Innumerable root canal sealers are time tested with definitive success rates. ³ An ideal root canal sealer should have low viscosity, good wetting properties, leaking resistance to promote improved sealing thus maintaining the bacteria inactive, ⁴ thin film thickness, low surface tension to flow into the irregularities and spaces between the gutta-percha cones and root canal and good adhesion (Grossman and Branstetter and Fraunhofer). ^{5,6} Different sealer formulations have been subjected to extensive research with respect to their mechanical and biological properties, reflecting that the appropriate selection of a sealer and its clinical performance may influence the clinical outcome. ⁷

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. ⁸ Permanent coronal restorations also provide seals equally as important as the apical seal after the root canals are filled. ⁹ When insufficient coronal sealing occurs or the root canal remains open (e.g., when sealing is delayed for permanent fillings, broken fillings, or secondary caries formation; etc), oral bacteria will access the apical foramen. ¹⁰ It is not easy to achieve a complete filling with the current root-filling materials used in the clinic, due to the dimensional changes and lack of adhesion from gutta-percha, which is also the reason to use endodontic sealers in combination of gutta-percha. Thus, the adaptability of a sealer to the dentin is the primary factor influencing microleakage and reinfection of the root canal. ¹¹ Many endodontic sealers are used in clinical practice, including the recently-introduced calcium silicate-based sealers. The EndoSequence BC sealer (Brasseler USA, Savannah, Georgia, USA; also named the iRoot SP; Innovative. BioCeramix Inc, Vancouver, British Columbia, Canada) has been introduced as an ideal premixed and injectable biomaterial in the clinical, exhibiting excellent radiopaque, zero-shrinkage, insoluble, and hydrophilic (using moisture from the dentinal tubules to initiate and complete its setting reaction) characteristics. ¹² Hence, this study was

conducted to evaluate the efficacy of two root canal sealers for root canal therapy.

MATERIALS & METHODS

A total of 20 molars were enrolled. The age group included was 25- 45 years. Teeth were divided into two groups of 10 teeth each based on the type of root canal sealers used. All the molars were evaluated clinically and radiographically at regular intervals.

Group I: Zinc oxide eugenol

Group II: Resin cement

The samples from all the two groups were obturated with gutta-percha as core material with respective sealers using a cold lateral condensation

technique. Medical history was taken. Data was collected and result was analysed using SPSS software. Chi square test was done. $P < 0.05$ was considered as statistically significant.

RESULTS

A total of 20 teeth were enrolled. The mean dye leakage was evaluated. In group I, mean dye leakage was 34.6 and in group II, the mean dye leakage was 7.9. On comparing the areas at baseline in group I, the value was 8.50 whereas in group II, it is 9.10. The areas at 6 months in group I was 5.32 and in group II was 6.02.

Table 1: Comparison of groups

Groups	Mean (dye leakage)	Standard deviation
Group I- Zinc oxide eugenol	34.6	7.23
Group II- Resin cement	7.9	7.34

Table 2: Comparison of area at baseline and at 6 months

Groups	Area at baseline	Area at 6 months
Group I	8.50	5.32
Group II	9.10	6.02

DISCUSSION

Invasion of microorganisms into the pulp is responsible for the pathogenesis and necrosis of the vital tissue.¹³ Elimination of infection from the root canal system followed by its maintenance was found to induce healing. Root canal sealers along with obturation material will provide a bacteria proof seal of the root canal system, preventing the leeway space and communications between the intracanal and extracanal environments.³ Root canal sealers leak to some extent, and most leakage occurs between the root canal walls and the sealer, but its use was found to significantly reduce apical leakage. A wide variety of root canal sealers are available, such as cements based on zinc oxide eugenol, calcium hydroxide, glass ionomer and epoxy resins.^{14,15} At present, sealers based on epoxy resin afford very good physical properties with excellent apical sealing, and ensure adequate biological performance, but had problems in working properties, radiopacity and retreatability.^{16,17} Hence, this study was conducted to evaluate the efficacy of two root canal sealers for root canal therapy.

In the present study, a total of 20 teeth were enrolled. The mean dye leakage was evaluated. In group I, mean dye leakage was 34.6 and in group II, the mean dye leakage was 7.9. A study by Kumar NS et al, studied fifty freshly extracted mandibular first premolars and sectioned at the cemento-enamel junction. Group I teeth were obturated with methacrylate resin-based sealer (EnoRez) and Group II teeth were obturated with epoxy resin-based sealer (AH Plus). Both the sealers produced apical leakage to a certain extent. The adaptation and resin sealer penetration in the coronal and middle thirds was better

than in the apical third of the root canal under SEM observation. The hybridized resin sealer tags in the coronal and middle thirds of Group I were much longer than that shown by Group II.¹⁸

In the present study, on comparing the areas at baseline in group I, the value was 8.50 whereas in group II, it is 9.10. The areas at 6 months in group I was 5.32 and in group II was 6.02. Another study by Thakur S et al, compared the clinical and radiological outcome of mineral trioxide aggregate (MTA) or epoxy resin as a root canal sealer compared with zinc oxide eugenol sealer. 45 single rooted teeth with periapical index Score 2 or more were allotted to three groups with 15 teeth in each group. Root canal treatment was performed in two visits and obturated with Gutta-percha as obturating material and zinc oxide eugenol as sealer in Group 1, epoxy resin as sealer in Group 2 and MTA mixed with propylene glycol as sealer in Group 3. Results suggested that there exists no statistically significant difference in clinical or radiological outcome of root canal therapy with three different types of sealers used.¹⁹ The successful root canal treatment requires three-dimensional obturation of the root canal system with nonirritating biomaterials. The majority of endodontic failures are attributed to the incomplete sealing of the root canals.²⁰ Thus, it is necessary to use materials, which will be able to create fluid tight seal between the root canal system and the periapical tissues.²¹

CONCLUSION

Resin cement sealed the root canals significantly better when compared with zinc oxide eugenol.

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