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Original Research

Assessment of flow rate of different root canal sealers

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ABSTRACT:
Background: The sealer also fills the voids between individual gutta-percha points applied during condensation. The present study was conducted to assess flow rate of different root canal sealers. **Materials & Methods:** All cements were divided into 4 groups. Group I comprised of Sealapex, group II had Adseal, group III had MTA fillapex and group IV had AH plus cement. Flow rate of sealers was calculated in all groups. **Results:** The mean flow rate was 20.5 mm, in group II was 21.7 mm, group III was 22.5 mm and group IV was 19.3 mm. The difference was significant (P< 0.05). **Conclusion:** Sealapex had minimum and Adseal had maximum flow rate.
Key words: Adseal, Flow rate, Sealapex

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INTRODUCTION

The main function of the endodontic sealer is to fill the gaps between the gutta-percha points and the walls of the root canal. The sealer also fills the voids between individual gutta-percha points applied during condensation.[1] To create and maintain a three-dimensional seal of the entire root canal system, sealers should have adhesiveness, be dimensionally stable, be insoluble to oral and tissue fluids, and have an adequate flow rate.[2] This latter property allows the material to penetrate into irregularities, isthmus fins and ramifications, which increases the likelihood of obtaining an adequate seal of the root canal system. Many types and brands of sealing cements are commercially available. They can be divided into the following types: eugenol-zinc-oxide based cements, calcium-hydroxide cements, glass ionomers, plastic resins and MTA-based cement.[3]

Flow is the ability of sealer which helps to penetrate irregularities and accessory canals of the root canal system. Greater the flow, the greater is the ability of a sealer to penetrate into irregularities of the root canal system. Conversely, if the flow is excessive, the risk of material leaching out to the periapex is more which could damage periodontal tissues. The composition of the sealers seems to be the main factor related to its flow characteristics.[4]

The flow test can be conducted by means of two international standards: American Dental Association (ADA) No. 57 (American National Standards/ADA 1983) or ISO-6876 (ISO 2001). The differences between ADA and ISO standards are of the volume analyzed and the minimum diameter of spread. The ISO 6876 specification recommends that the volume of sealer to be taken is 0.05 ml (±0.005 ml) and each compressed disc shall have a diameter not <20 mm.[5]

The present study was conducted to assess flow rate of different root canal sealers.

MATERIALS & METHODS

The present study was conducted among four root canal sealers such as Sealapex, Adseal, MTA fillapex and AH plus cement. The study approval was obtained from ethical committee.

All cements were divided into 4 groups. Group I comprised of Sealapex, group II had Adseal, group III had MTA fillapex and group IV had AH plus cement. A volume of 0.05 mL of the cement was placed on a glass plate 40 mm x 40 mm and approximately 5mm thick using a graduated disposable 1-mL syringe. At 180±5 seconds after the initiation of mixing, it was placed the second glass plate carefully and centrally on top of the sealer, followed by the weight of mass approximately 100 g to make a total mass on the plate of 120±2 g. Ten min after the start of mixing, the weight was removed and the values of the maximum and minimum diameters of the compressed discs of sealer were measured by a digital caliper. Flow rate of sealers was calculated in all groups. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of sealers

Groups	Group I	Group II	Group III	Group IV
Sealers	AH plus cement	Adseal	MTA fillapex	Sealapex

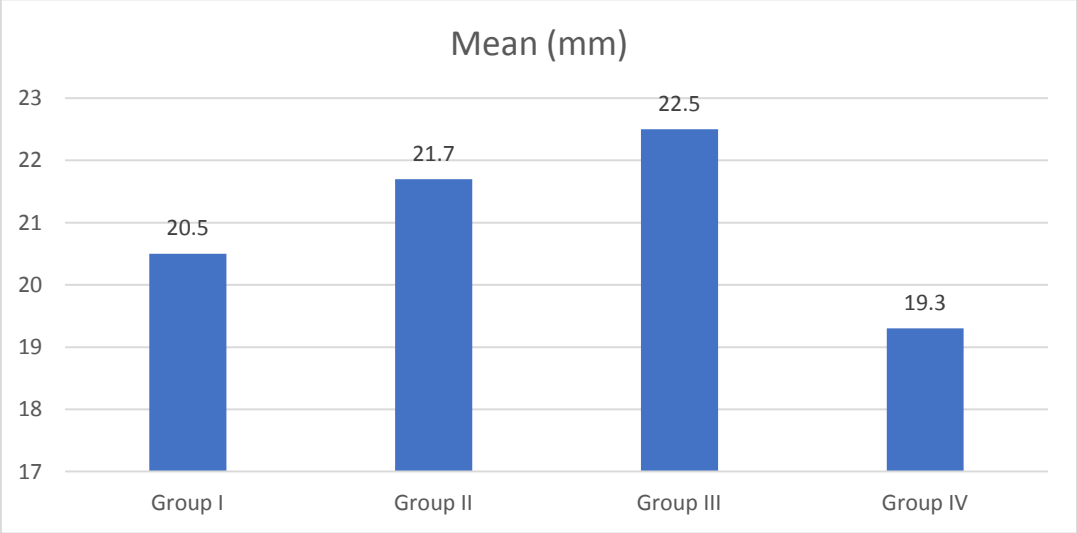
Table I shows distribution of sealers among 4 groups.

Table II Flow rate of root canal sealers

Groups	Mean (mm)	P value
Group I	20.5	0.14
Group II	21.7	
Group III	22.5	
Group IV	19.3	

Table II, graph I shows that mean flow rate was 20.5 mm, in group II was 21.7 mm, group III was 22.5 mm and group IV was 19.3 mm. The difference was significant (P< 0.05).

Graph I Flow rate of root canal sealers



DISCUSSION

Success in endodontic treatment depends on the prevention and control of root canal infection which is achieved by adequate cleaning, shaping, and filling. One of the primary goals of successful endodontic treatment is the complete canal obturation.[6] Root canal filling is done by core materials like gutta percha and root canal sealers. Root canal sealer is used to fill the minute gap between the core material and root canal wall. Dowsen and Garber[7] emphasized that the paste (sealer) is an extremely important part of the filling regardless of whether silver cones, gutta-percha points, or a combination of filling materials are used. According to Siskin and Coolidge[8], the sealer must be thin and plastic enough to fill the canal space and provide a hermetic seal. According to Schilder[9], three-dimensional seal of the root canal is provided by root canal sealer. The present study was conducted to assess flow rate of different root canal sealers.

In our study, mean flow rate was 20.5 mm, in group II was 21.7 mm, group III was 22.5 mm and group IV

was 19.3 mm. Bhushan et al[10] assessed flow rate of different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus. Flow rate of sealers was calculated. The mean flow rate in group I was 19.2, in group II was 22.5, in group III was 21.9 and in group IV was 20.4. The difference was significant ($P< 0.05$). Authors found that maximum flow was achieved with Adseal whereas minimum with Sealapex.

Several properties of root canal sealers have been studied, such as setting time, solubility, disintegration, film thickness, and dimensional changes after setting, biocompatibility, and antimicrobial activity.[11] It is also important that a root canal sealer has a suitable flow to enter the narrow irregularities in dentin, accessory canals and voids between master and accessory cones. Less flow and working time results in inability to work effectively with a material increasing the chances of a void being created.[12] Several factors may influence the penetration of endodontic sealers within confined areas of the root canal system.[13] Among them, the obturation technique used, the contact area, the dimension of irregularities, accessibility to the complexities, and the sealer's flow rate seem to play an important role in allowing sealer penetration.[14]

Kaplan et al[15] evaluated the flow of five endodontic sealers (Procosol, AH 26, Endomethasone, Sealapex and Endion) and concluded that the different results obtained suggest that the factor determining flow may not be the composition, but their final consistency and the setting reaction. Our findings corroborate this statement, because even though Acroseal and Sealapex are both paste/paste and calcium hydroxide based endodontic sealers, flow rate of Sealapex was significantly higher. Faria-Júnior et al[16] assessed the flow rate of the Acroseal, AH Plus, Endomethasone N, Sealapex, and ActiV GP according to the standards of the ISO specification 6876/2001. The results obtained were: Acroseal 21.24 mm, AH Plus 22.72 mm, ActiV GP 24.90 mm, Endomethasone N 18.76 mm, and Sealapex 25.15 mm.

CONCLUSION

Authors found that Sealapex had minimum and Adseal had maximum flow rate.

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