

## ORIGINAL RESEARCH

### Assessment of flow rate of different root canal sealers- An *in-vitro* study

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#### ABSTRACT:

**Background:** Success in endodontic treatment depends on the prevention and control of root canal infection which is achieved by adequate cleaning, shaping, and filling. The present study was conducted to assess flow rate of different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus. **Materials & Methods:** This invitro study was conducted in which different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus divided into 4 groups. Flow rate of sealers was calculated. **Results:** 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 ( $P < 0.05$ ). **Conclusion:** Authors found that maximum flow was achieved with Adseal whereas minimum with Sealapex.

**Key words:** Adseal, Fillapex, Sealapex

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#### INTRODUCTION

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.<sup>1</sup> 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.<sup>2</sup>

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. 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.<sup>3</sup> 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.<sup>4</sup>

Dowsen and Garber<sup>5</sup> 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, the sealer must be thin and plastic enough to fill the canal space and provide a hermetic seal. The present study was conducted to assess flow rate of different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus.

#### MATERIALS & METHODS

This invitro study was conducted in the department of Endodontics. It comprised of different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus divided into 4 groups. The study approval was obtained from institutional ethical committee.

A volume of 0.05 mL of the cement mixed according to the manufacturer's recommendations 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 s after the commencement 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. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

**RESULTS**

**Table I Distribution of different sealers**

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

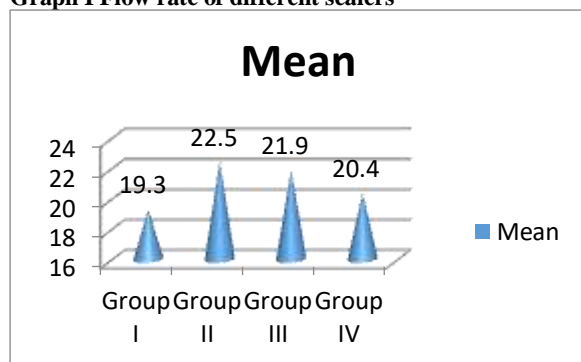
Table I shows distribution of sealers in group I, II, III and IV.

**Table II Flow rate of different sealers**

Groups	Mean	P value
Group I	19.3	0.05
Group II	22.5	
Group III	21.9	
Group IV	20.4	

Table II, graph I shows that 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).

**Graph I Flow rate of different sealers**



**DISCUSSION**

The resin-based epoxy sealer AH Plus is a modified version of AH 26. Some studies have demonstrated that this material presents good radiopacity, low solubility, high bond strength to root canal dentin, excellent flow and a thin film thickness.<sup>6</sup> Sealapex is a calcium hydroxide-based sealer that has antibacterial activity, good biological properties, high pH and calcium ion release, and good radiopacity. The manufacturer of Sealapex has recently modified its formulation by adding bismuth trioxide to improve its radiopacity and increase its shelf life.<sup>7</sup>

The flow test can be conducted by means two international standards: American Dental Association (ADA) no. 57 (American National Standards/American Dental Association 1983) or International Standards Organization (ISO)-6876 (International Organization for Standardization 2001). The only differences between ADA and ISO standards are the volume analysed and the minimum diameter of spread, thus to test the ISO 6876 specification, the volume of sealer is 0.05 mL (±0.005 mL) and each compressed disc shall have a diameter not <20mm.<sup>8</sup> The present study was conducted to

assess flow rate of different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus.

In this study, different root canal sealers such as sealapex, Adseal, MTA fillapex and AH plus divided into 4 groups. We found that mean flow rate of sealers 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. Dash et al<sup>9</sup> compared the flow abilities of four different root canal sealers namely, AH Plus, mineral trioxide aggregate (MTA) Fillapex, Sealapex and Adseal. According to the method proposed by International Organization for Standardization (ISO) specification 6876/2012 (root canal sealing materials), a volume of 0.05 ml of the cement was taken and mixed according to the manufacturer's recommendation and placed on a glass plate. At 180 ± 5 s after mixing, the second glass plate of 20 g was placed on top of the sealer, followed by the weight of mass 100 g to make a total mass on the plate of 120 ± 2 g. After 10 min from the start of mixing, the weight was removed and the diameter of the compressed disc of sealer was measured. The mean of five such values for each sealer was taken as the flow of the material.

Faria-Júnior et al<sup>10</sup> evaluated 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.

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. 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. Several factors may influence the penetration of endodontic sealers within confined areas of the root canal system.<sup>11</sup>

Kaplan et al<sup>12</sup> assessed 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.

**CONCLUSION**

Authors found that maximum flow was achieved with Adseal whereas minimum with Sealapex.

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