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Research Article

EVALUATION OF APICAL SEALING ABILITY OF MTA-FILLAPEX SEALER USING THERMOPLASTISIZED OBTURATION TECHNIQUE

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ABSTRACT

The aim of this study was to compare the apical sealing ability of MTA-FILLAPEX sealer using thermoplastisized obturation technique and lateral condensation technique. 30 human lower premolar teeth with single canal were selected. The teeth were divided into 3 groups, 10 teeth in each group. The teeth were cleaned and shaped using Revo-S file system till SU and teeth were obturated:

Group 1: Obturation was done using lateral condensation technique using MTA-FILLAPEX and 6% 25 tip size GP points.

Group 2: Obturation was done using Thermoplastisized obturation technique (Sybron-Endo) using MTA-FILLAPEX SEALER.

Group 3: Control group. In both this method lowest mean leakage was observed with thermoplastisized technique of obturation. Results are statistically insignificant.

Keywords: MTA-Fillapex sealer, Microleakage, Thermoplasticised obturation, Lateral condensation, Revo-S.

INTRODUCTION

MTA was originally developed to seal perforations and root-end preparations and it is the most prominent dental material used currently. Its sealing ability has been demonstrated in-vitro to be superior to that of Amalgam, Super EBA, Glass ionomer cement, Intermediate restorative material (IRM) and other materials¹. MTA has shown adequate biological properties with formation of mineralized tissue in close contact with the material, less apical inflammation and deposition of cementum when compared with amalgam, Super EBA, intermediate restorative material and ZOE in putty like consistency.³ Various studies have demonstrated periapical repair and regeneration of the periodontal ligament when MTA is used in endodontic surgery. It has proven biocompatible both in in-vitro and in-vivo investigations. It is found to be more opaque and provides superior seal when compared with gutta percha and other endodontic filling materials.⁵ MTA when used as root-end filling material have been proved to be superior in the rate of microleakage, marginal adaptation and also showed evidence of healing of the surrounding tissues as compared with the traditionally used filling material.⁴

According to Gartner and Dorn an ideal material to seal the root canals apically and coronally should prevent leakage of

micro-organisms and their by-products into the periradicular tissues². It should also be non-toxic, non-carcinogenic, and biocompatible with the tissue fluids and dimensionally stable. The presence of moisture should not affect its sealing ability. Coronal seal can deteriorate because of delayed permanent restoration, fracture of the restoration or tooth crown. In such cases the exposed root canal filling materials remain the only barrier between oral environment and periradicular tissues. Though many different filling materials and techniques have been proposed for root canal fillings, lateral condensation technique employing gutta percha has been the method of choice for over a century. Various studies have now suggested mineral trioxide aggregate [MTA] as a good alternative for root canal filling⁶. MTA has been shown to be very effective in sealing the paths between root canal system and its surroundings. Orthograde use of MTA for the entire root canal system has been suggested. Hence the aim of the study was to evaluate the sealing ability of MTA Fillapex using thermoplasticised obturation and lateral condensation technique.

MATERIALS AND METHODS

30 human lower premolar with single canal were selected for this study (from the Department of Oral and Maxillofacial

Surgery, School of Dental Sciences, KIMSUDU, Karad). The extracted teeth were kept in normal saline. Access opening was done using standard protocol. Working length was determined by inserting 10 number k file beyond apex and pulling file till apical foramen such that file was seen at apical foramen. The length was measured and 1mm was subtracted, readings were noted. Cleaning and shaping was done with Revo S file system, till SU (25 tip size, 6%taper). The teeth were divided into 3groups. **Group 1:** Obturation was done using lateral condensation technique using MTA-FILLAPEX and 6% 25 GP points. **Group 2:** Obturation was done using Thermoplastisized obturation technique (Sybron-Endo-Figure 1a) using MTA-FILLAPEX SEALER. **Group 3:** Control group. The teeth were then coated with nail varnish after

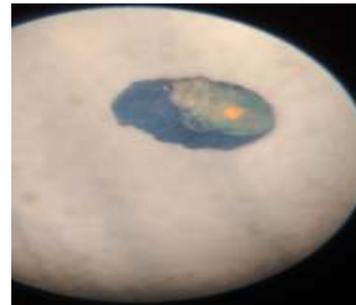
apical foramen was sealed with modelling wax. The teeth were then kept in normal saline. The 1% methylene blue dye was used for evaluation of microleakage. The samples were kept in dye for 2 weeks. The horizontal sectioning of the samples were made with diamond disc at horizontal penetration into the gutta percha at 2mm, 4mm and 6mm respectively. The dye penetration was evaluated using stereomicroscope (Figure 1b). Score 0 & 1 were given for absence and presence of dye penetration at 2mm, 4mm and 6mm respectively. Score 1, 2 and 3 for 1/3rd, 2/3rd and full dye penetration till the centers of obturation core material respectively were given (Figure 1c). The result was statically analyzed by one way ANOVA test.



a: Thermoplastisized obturation unit



b: Stereomicroscope.



c: Section image under stereomicroscope

RESULTS

Presence of Microleakage at 2mm, 4mm and 6mm in those who received lateral condensation technique of obturation when compared to thermoplastisized technique of obturation was similar and insignificant (Mann Whitney U-statistic= 40.000, P=0.4579, Mann Whitney U-statistic= 30.000, P=0.1277, Mann Whitney U-statistic= 35.000, P=0.2595) respectively.

Presence of extension of microleakage at 2mm, 4mm and 6mm in those who received lateral condensation technique of obturation when compared to thermoplastisized technique of obturation was similar and insignificant (Mann Whitney U-statistic= 41.500, P=0.5325, Mann Whitney U-statistic= 34.500, P=0.2383, Mann Whitney U-statistic= 34.000, P=0.2284) respectively.

Table 1: Average mean & standard deviation values for presence of microleakage at 2mm, 4mm and 6mm

GROUPS	MEAN	STANDARD DEVIATION (SD)
AM2*	0.4	± 0.5164
AM4*	0.5	±0.5270
AM6*	0.5	±0.5270
BM2*	0.2	±0.4216
BM4*	0.1	±0.3162
BM6*	0.2	±0.4216

*AM2,AM4,AM6---Microleakage at 2mm,4mm and 6mm in lateral condensation technique.
 BM2, BM4, BM6--- Microleakage at 2mm, 4mm and 6mm in thermoplasticised obturation technique.

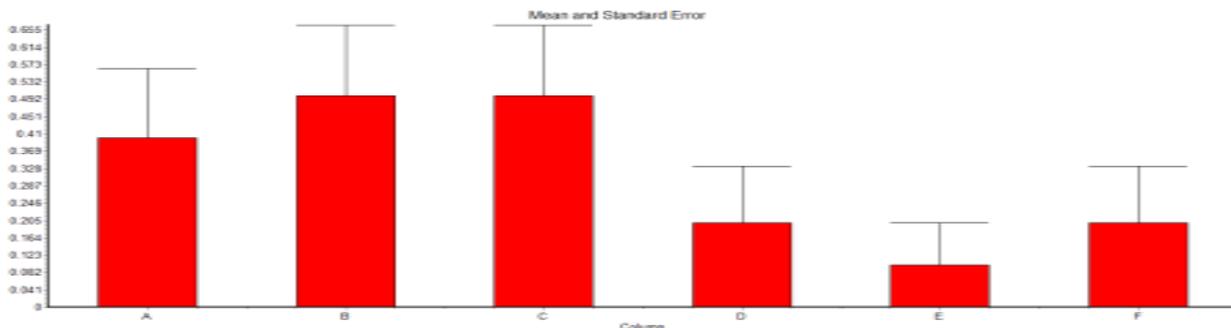


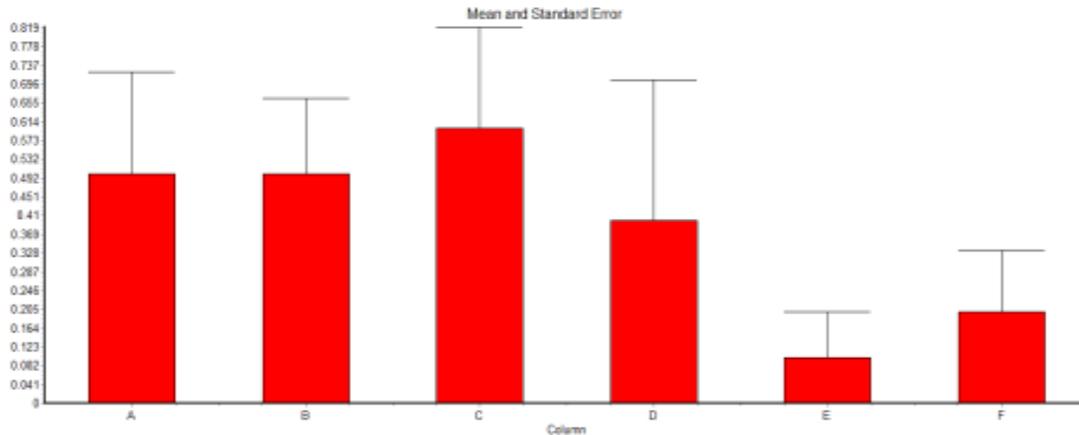
Figure 2: Graphical variation of presence of microleakage at 2mm, 4mm and 6mm.

Table 2: Average mean & standard deviation values for extension of microleakage at 2mm, 4mm and 6mm

GROUPS	MEAN	STANDARD DEVIATION (SD)
AE2*	0.5	± 0.7071
AE4*	0.5	±0.5270
AE6*	0.5	±0.6992
BE2*	0.4	±0.9661
BE4*	0.1	±0.3162
BE6*	0.2	±0.4216

*AE2,AE4,AE6---Extension of microleakage at 2mm,4mm and 6mm respectively in lateral condensation technique.

BE2, BE4, BE6---Extension of microleakage at 2mm, 4mm and 6mm respectively in thermoplasticised obturation technique.

**Figure 3: Graphical variation of extension of microleakage at 2mm, 4mm and 6mm**

DISCUSSION

There is a growing body of evidence that emphasizes the significance of apical and coronal seal in the success of endodontic treatment. MTA Fillapex has proven to be an endodontic material of choice with potential for several clinical applications due to its superior sealing properties for example its ability to set in the presence of moisture or blood and biocompatibility¹.

In this study, lateral condensation technique and thermoplasticized obturation techniques were used for evaluation of MTA Fillapex sealer. Cleaning and shaping were done using Revo S file system, till SU (25tip size, 6% taper). Revo S file system was used because of their advance properties. Their taper perfectly matches canals shape and thus guarantees perfect and efficient shaping of canals. Obturation of one group was done using lateral condensation technique because deep spreader penetration property minimize apical leakage/ percolation, positive dimensional stability of root canal filling and less likelihood of carrying filling material beyond the root apex. Obturation of other group was done using thermoplasticized obturation technique because of simplicity, speed and the ability to fill canal irregularities.⁷ Moreover obtura 2 is best used in presence of canal irregularities (fins, webs, cul-de-sacs, internal resorption, C-shape canal, accessory and lateral canals). The teeth were then coated with nail varnish after apical foramen was sealed with modelling wax and then kept in normal saline. Then 1% methylene blue dye was used for checking microleakage. Methylene blue is a heterocyclic aromatic chemical

compound⁸⁻¹⁰. It has a pH of 3 in water and hence is easily and extensively absorbed. The samples were kept in dye for 2 weeks. The horizontal sectioning of the sample was done at 2mm, 4mm and 6mm respectively. It was observed and noted that microleakage was less in those specimen which were obturated with help of thermoplasticized obturation technique in comparison to those obturated with help of lateral condensation technique as the previous studies also suggests the less leakage of obturation using thermoplasticised obturation technique.

CONCLUSION

Teeth obturated using thermoplasticised obturation technique with MTA Fillapex as sealer gives better results of sealing the apical third of root canal.

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