



## EVALUATION OF VOIDS IN THERMOPLASTICIZED OBTURATION USING MTA-FILLAPEX SEALER

### Dental Science

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### ABSTRACT

The aim of this study was to evaluate the presence of voids in thermoplasticized obturation technique using MTA Fill apex as a sealer. 20 human mandibular premolar teeth with single canal were selected. The teeth were divided into 2 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% 25tip size GP points. Group 2: Obturation was done using Thermoplasticized obturation technique (Sybron-Endo) using MTA Fillapex as Sealer. In the both obturating technique minimal void observed with group 1 having more voids compared to group 2 but results are statistically insignificant.

### KEYWORDS

MTA-Fillapex sealer, Voids, Thermoplasticised obturation, Lateral condensation, Revo-S Files.

### I. INTRODUCTION

Achieving successful and well prognosis of root canal treatment, the most important step is the three dimensional obturation in Endodontics.[1] And this can be achieved using the most advanced techniques of obturation like thermoplasticised obturation.[2] Single cone (SC) obturation technique utilises single cone with appropriate taper that fit well in prepared canal circumference.[3] At present, availability of various nickel-titanium (Ni-Ti) instruments having a specific taper with corresponding sized Gutta-percha that is appropriate for Single Cone technique.[4] It is proved that any presence of voids in the obturation allows toxins to pass beyond periapical area and causing reinfection and hence effects the quality of obturation.[3,5] Gutta-percha is a kind of solid core obturation material, the occurrence of voids can be expected to occur within the sealer mass or at the interface in the gutta percha accessory cones.[6] Therefore, it is very important to quantify the area of voids in the obturation to assess the quality of obturation and potential for any leakage and cultivation of microbes in obturation.[7] Presence of voids can be very often in an Single Cone technique as the volume of sealer used in this technique is larger than with other techniques.[3] It is outmost important to have sealer devoid of or display minimal voids when used with Single Cone technique. Based on chemical composition many root canal sealers are available such as calcium hydroxide-based, zinc oxide-eugenol-based, glass ionomer-based, and resin-based, bioceramic. A new material recently has been introduced, a calcium silicate-based biomimetic sealer Mineral Trioxide Aggregate (MTA) "Fillapex" (Angelus, Londrina, Brazil) has been introduced for successful endodontic outcome. The chemical composition of this sealer is based on the MTA composition with modified additives with suitable consistency for root canal treatment.[8] According to the study, MTA Sealer has high radiopacity, low solubility in contact with tissue fluids, compatible with tissue, expansion during setting and excellent viscosity for insertion. It does not discolor and stain the tooth and promotes regeneration of hard tissue at the perforated root apex and perforation sites.[9] It has been shown that MTA Fillapex is radiopaque, and less soluble. Hence the aim of the study was to evaluate the presence of voids in thermoplasticized obturation technique using MTA-Fillapex sealer.

### II. MATERIALS AND METHOD

For this study 20 human lower premolar with single canal were selected. Extracted teeth were stored in the humid environment. Access opening was done following ideal and standard principles. Canal located and working length was determined by inserting 10 k file

into the canal till the file was seen beyond the apex, file retracted back in the canal till the tip of file was seen at major foramen. Subtracting 1mm from this measured length considered as corrected working length. Cleaning and shaping and mechanical debridement was done with Revo S file system, till SU (25 tip size, 6% taper). Ideal protocol followed during cleaning and shaping. The teeth were divided into 3 groups. Group 1: Obturation was done using lateral condensation Single Cone obturation technique using MTA-FILLAPEX and 6% 25 GP points. Group 2: Obturation was done using Thermoplasticized obturation technique (Sybron-Endo-Fig.1) using MTA Fillapex Sealer using standard protocol and techniques. Sectioning of the samples were made using diamond disc at horizontal penetration through roots at 2mm and 4mm respectively. The presence and the validated number of voids were calculated using stereomicroscope. Score were given according to number of presence of voids from periphery till the center of obturation core material (Fig.2). The results were statically analyzed by one way ANOVA test.



Fig.1. Thermoplasticized obturation unit

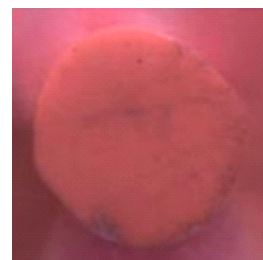


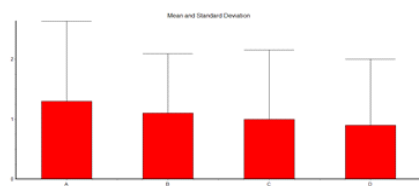
Fig.2. Section image under stereomicroscope

### III. RESULTS

Presence of number of voids at 2mm and 6mm in those who received lateral condensation technique of obturation when compared to thermoplasticized technique of obturation were statistically insignificant, the average mean at 2mm for group 1 are  $1.3 \pm 1.337$  and for group 2 are  $1 \pm 1.155$ . the average mean at 4mm for group 1 are  $1.1 \pm 0.994$  and for group 2 are  $0.9 \pm 1.101$ . (Mann Whitney U-statistic= 0.1741, P=0.4579 and Mann Whitney U-statistic= 0.6325, P=0.5350) respectively.

**Table A: Average mean & standard deviation values for presence of voids at 2mm and 4mm.**

	Group 1		Group 2	
	Average mean	Standard deviation	Average mean	Standard deviation
At 2mm	1.3	$\pm 1.337$	1	$\pm 1.155$
At 4mm	1.1	$\pm 0.994$	0.9	$\pm 1.101$



**Fig. 4: Graphical variation of presence of voids at 2mm and 4mm.**

### IV. DISCUSSION

There are large amount of evidences that the apical seal and coronal seal are the most important in the success of endodontic treatment. In recent era MTA Fillapex has been emerged as material of choice as a sealer, because of its biocompatibility, osteoconductive properties and ability to seal the canals as its sets even in the presence of moisture and blood[10]. Apical sealing is the most important aspect in obturation, not even in the routine root canal treatment even success of endodontic surgical procedures depends on apical sealing ability of obturating materials. New root-end filling materials, such as SuperEBA and MTA, may reduce apical leakage and increase the percentage of successful surgical cases.[11]

In this study, lateral condensation technique and thermoplasticized obturation techniques were used for evaluation of obturation with commonly used 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 unique and advance properties. Their taper perfectly matches canals shape without undue cutting of dentin and thus guarantees the efficient shaping of canals and sufficient mechanical debridement. Most commonly used technique of obturation is the lateral condensation technique, Obturation of one group was done using lateral condensation technique because spreader penetration close to the minor constriction to receive accessory gutta percha points that minimizes the apical leakage/ percolation, accurate dimensional stability of root canal filling and less likelihood of pushing the filling material at periapical area. [6] Anyhow leakage of obturation or the coronal leakage will take very little time to infect the root canal, in one study they found the number of days required for these bacteria to penetrate the entire root canals was determined. Over 50% of the root canals were completely contaminated after 19-day exposure to *S. epidermidis*. Fifty percent of the root canals were also totally contaminated when the coronal surfaces of their fillings were exposed to *P. vulgaris* for 42 days.[12] In another study they evaluated the contamination of bacteria in root canal treated teeth, they found, all root canals were recontaminated in less than 30 days. Hence obtaining the void free environment in obturation is recommended.[13] Obturation of other group was done using thermoplasticized obturation technique because of efficiency of softened gutta percha to fill the irregularity and ramifications of the root canal system.[17] In study, they evaluated the adaptability of obturating material to the canal wall using Thermafil obturation, Obtura II thermoplasticized obturation and lateral condensation, they found the more adaptability and more filling with thermoplasticized Obtura II technique of obturation. Sealer plays pivotal role in the obturation, Sealer used in this study is MTA Fillapex as it is more biocompatible and has high sealing potential, in a other study, they evaluated the ability of mineral

trioxide aggregate (MTA) to seal the root end effectively. In this study they found MTA was determined to be superior to amalgam, and comparable with Super-EBA in preventing microleakage when used as a root-end filling.[14,15,16] That is the reason these promising materials need to be evaluated in different aspects of properties.[15] Moreover thermoplasticized obturation is the best way to be used in the complex root canal system with presence of canal irregularities (lateral canals, accessory canals, fins, webs, cul-de-sacs, internal resorption, C-shape canal). The horizontal sectioning of the sample was done at 2mm and 4mm respectively, as the number voids and deficiency in obturation found most commonly in the apical third of the root canals. [18,19] It was observed and noted that number of voids were less in samples 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 thermoplasticized obturation technique.[15]

### V. CONCLUSION

Teeth obturated using thermoplasticized obturation technique with MTA Fillapex as sealer gives better results of sealing the apical third of root canal compared to the lateral condensation technique using same sealer. Need further studies to evaluate the sealing potential with different techniques.

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